

MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXV.

Published every Thursday at
418-19 Perry-Payne Bldg., by
the Marine Review Pub. Co.

CLEVELAND, O., MARCH 13, 1902.

Subscription \$3.00 a year.
Foreign \$4.50 a year.
Single Copy 10 cents.

No. 11

SENATOR HANNA ON THE SHIPPING BILL.

A notable speech was made in the United States senate by Mr. Hanna on the shipping bill, which he discussed from the point of view of an American business man. His arguments were carefully arranged, he was always forceful and earnest and at times eloquent. He commanded the undivided attention of the senate and of the galleries and when he closed he received congratulations from many of his colleagues. In fact Mr. Hanna repeated his success of last year when, even throughout Great Britain, his speech was regarded as the ablest delivered on the shipping bill. Mr. Hanna possesses the quality of eloquence to an unusual degree and the cause thereof is not far to seek. It is founded upon sincerity, which ever was, and ever will be, the parent of eloquence. Mr. Hanna's remarks were principally in answer to Mr. Clay's speech. He said that when Mr. Clay quoted from Mr. Frye's speech that all there was in this question which required legislation was embraced in the one question of labor, he was correct. "I stand by that proposition," he declared, "but I go further. The ore in the ground is worth about 25 cents a ton. After it was touched by the hand of man it was labor. Ninety-five per cent. of a ship built in an American ship yard, or in any ship yard, is purely labor. The cost of the construction of a ship in the United States as against that in either England, Germany or France simply measures the difference of wages and the efficiency of American labor."

Mr. Hanna declared that the merchant marine was the only industry in the United States which has not received the fostering care of this government. "Will anybody deny," said he, "the importance, the absolute necessity, of having an auxiliary for our navy in the form of a merchant marine, shaped under the direction of the navy department, and in time of war absolutely in the hands and under the control of the president of the United States, to use it in the most effective manner?"

If the United States failed to profit by the experience of the older countries of Europe, who have adopted a policy in reference to maritime matters, it would make a most serious mistake. Every merchant ship constructed in foreign countries was meant to be a ship of war in time of need. Mr. Hanna cited the feeling of uneasiness along the Atlantic coast at the beginning of hostilities with Spain, and the relief which was experienced when the four steamers of the American line were called on by the secretary of the navy, under the conditions of the law passed by congress, to perform picket service. He insisted that it was as important a national question as an economic policy to carry with the expenditure for building up the navy the expenditure for an auxiliary navy and a merchant marine.

"There is something more in this transportation question," he said, "than merely carrying mail letter bags; there is more in it than dollars and cents to the United States. He would like it to be discussed above party considerations, because every one felt a like pride in the country's advancement and development, and whatever is best for the interests and safety and the perpetuity of American institutions is best for all." Mr. Tillman interrupted to ask for information in regard to the reports that the Morgan syndicate had bought two or three of the European lines of steamers.

"You must ask somebody who knows," replied Mr. Hanna. "I do not know anything about it."

"It was only reported, you know," suggested Mr. Tillman, "and I thought that the senator, being in touch with that class of people"—

"Why does the senator say I am in touch with them?" asked Mr. Hanna.

"The senator is a man engaged in shipping, is he not?" said Mr. Tillman.

"On the great lakes, yes," responded Mr. Hanna, "but why does the senator assume that I know what Mr. Morgan has done?"

"I thought the senator and Mr. Morgan were friends," replied Mr. Tillman.

"I know nothing about the purchase of the Leyland line by J. P. Morgan & Co.," said Mr. Hanna, "any more than the senator does. That is simply the investment of American capital. Under the provisions of this bill not a single one of those vessels ever will come under an American register or an American flag."

Mr. Hanna said capital seeks only investment from which it can get returns.

"If that be true," inquired Mr. Tillman, "why did the German emperor not go to England to get his yacht built instead of coming to this country?"

Mr. Hanna said there were some things he could not answer, but he thought Prince Henry was glad the emperor did not do it.

"Perhaps the senator has not heard of the success and prestige of America in the yacht line," suggested Mr. Hanna, amid laughter. "The German emperor wanted the best yacht, and therefore came here."

Mr. Tillman wanted to know what kind of yacht it was, and Mr. Depew described it as a sailing racing machine of the same type as beat the two Shamrocks.

Mr. Hanna declared that not an American ship yard had a contract for another merchant vessel after the nine or ten vessels now under contract were finished. Everybody knows, continued Mr. Hanna, that the United States is now engaged in a hand to hand contest with foreign nations to secure the commerce of the orient and that the United States had been foremost and steadfast in its policy to secure the markets of China and hold them as an open door. The Philippine Archipelago was the key to the orient, and when it had become a naval station surrounded by all the protection that a maritime fleet would need it would become a factor in commercial conditions in the orient. Mr. Hanna then said it was the purpose of the bill, under the postal system, to establish a line on the Atlantic coast to South America. England had gained her

supremacy in the markets of the world by pursuing the policy of establishing direct communication.

"Personal contact," he said, "is what brings results, and England, Germany and France are now energetically at work to put in the connecting link between the Pacific and the orient." He spoke of the benefit that the passage of the bill would bring as a result of increased trade with South American countries, saying that the trade now went by way of Liverpool and Hamburg in foreign ships, and thence was transhipped to South American ports. By carrying American goods in American ships there would be an increase of American trade.

In closing Mr. Hanna again alluded to the question of the cost of labor, maintaining that wages in this country averaged 50 per cent. higher than in European countries. The cost of ships built in the United States was from 25 to 30 per cent. higher than those built in Great Britain, the difference in the price of labor making the difference in cost. The difference between the cost of operating American and foreign ships was about 27 per cent., the higher rate being paid on American vessels. He urged that the pending measure be enacted into a law as the one way to demonstrate to the satisfaction of all that it would be beneficent in its operation. More as an appeal than as an argument to those who were not convinced of the excellent results to be obtained from the bill, he said, he besought congress to keep pace with the world in exercising the natural advantages and commercial resources of which all Americans were so proud.

Early in the session Mr. Frye, in charge of the shipping bill, obtained an agreement that the senate should vote on the measure and all pending amendments at 3 p. m. Monday, March 17, that time being satisfactory to the opponents of the bill.

SAULT POWER CANAL QUESTION.

Dispatches from Washington during the past week refer to agreements between the water power canal interests at Saut Ste. Marie and President Livingstone of the Lake Carriers' Association regarding a clause pertaining to the power canal in the river and harbor bill. There has been no agreement other than that which was entered into two years ago after full deliberation and several conferences between the vessel owners and representatives of the power canal company. Members of the legislative committee of the Lake Carriers' Association and members of a special committee that went into the power canal question very thoroughly two years ago will take the subject up again this week (probably in Washington on Friday), but as yet the position of the association is just as it has been from the beginning—not one of opposition to power canal enterprise, but that the navigation interests must be safeguarded before the power canal is opened.

It will be remembered that when this matter was taken up before the river and harbor committee in 1900, a committee of leading lake vessel owners spent weeks upon it and finally agreed with the power canal officials upon a bill of considerable length that was to be introduced in congress as a measure separate from the river and harbor bill. The vessel owners were satisfied that this measure safeguarded the navigation interests. For some reason the power canal interests made no effort to secure its passage. It has hardly been heard of since. Now they want a short paragraph in the river and harbor bill as a substitute for the special bill. It is admitted that this power canal matter involves the question of how far congress may go in delegating power to the secretary of war; that this one clause in the river and harbor bill may be to the vessel interests of the lakes as important as the entire bill, and that the problem of water levels in the lake region is certainly a difficult one, especially in view of the Canadian interests that must be taken into account. Representatives of lake shipping therefore intend to move slowly in the matter, and this is why they propose to give to any clause in the river and harbor bill the same careful consideration that was given to the special measure agreed upon in 1900.

LAKE FREIGHT MATTERS.

An early opening of navigation is generally expected in the lake region, and yet the vessel owners who do not, of course, desire an early opening, could prevent it this year with less disturbance to the general shipping interests than in any year for a long time past. The grain stored in vessels at Chicago, and which must, according to the usual practice, move on to Buffalo as soon as the Straits of Mackinaw are open, amounts to practically nothing this year. It is also true that with a marked reduction of late years in the number of owners controlling vessels that are not allied to the ore companies an agreement to hold a large number of vessels in port until about May 1 could be made with less difficulty than in the past. Such an agreement is talked of, and while it may be regarded as improbable in the light of past experience, there are many special reasons for it in the conditions that exist at this time, not least of which is the difference between owners and shippers over the 80-cent season ore rate. In the absence of more 80-cent contracts than have as yet been made a very large fleet of vessels would be free of contract engagements and could be held in port as long as owners saw fit to keep them tied up.

But if weather conditions, which seem to be the only feature of uncertainty now, admit of an opening as early as the first week in April the vessels of the ore companies will undoubtedly be found moving. Plans are being made to start as early as possible. There are no labor difficulties in sight. It is expected that agreements with dock labor at Lake Erie ports, now being fixed up at meetings in Cleveland, will be practically the same as existed last year.

An announcement favorable to the lumber carriers is the charter within the past few days of several vessels at a rate of \$2.50 per thousand feet from the head of the lakes to Ohio ports. This is an indication of a profitable trade in lumber throughout the season.

SHIP BUILDING AT PHILADELPHIA.

Philadelphia, March 19.—The New York Ship Building Co., Camden, N. J., has been awarded a contract by the J. M. Guffey Petroleum Co. of this port for a bulk oil carrying steamship with a capacity of 2,500,000 gallons. The new vessel will be built of steel and will use oil for fuel. Fast work is stipulated in the contract with the end in view to have the vessel ready for sea in about a year. The tanker will approximate in size and general design to the Chesapeake, now engaged in the European oil trade out of Philadelphia. She is intended for the Guffey company's export business, as no doubt is now entertained regarding its determination to invade the foreign market. It may be said that this concern was averse to contracting for new vessels, having a preference to purchase them and thus avoid the delay incidental to construction. Their agents scoured the entire Atlantic seaboard in addition to the lakes in a futile effort to secure suitable bottoms except in three instances previously mentioned in the Review.

The Ward line steamship *Vigilancia* has arrived at Cramp's ship yard from New York. She will receive new boilers in addition to an elaborate overhauling, which will make her the equal of any vessel now in the fleet of the New York & Cuba Mail Steamship Co. While on a voyage from Mexico to Havana in January, 1901, the *Vigilancia* ran ashore on Colorado bank, off the coast of Cuba. She struck hard and fast and all efforts to float her were unavailing until last June, when she was finally got into

feasible, but if this speed is in the *Barry* her builders will do their utmost to have her make good. It is now believed in ship building circles that the government will accept this trio of destroyers; at least this will apply to the *Bainbridge*, which will not be called upon to undergo another trial trip.

Miss Roberta M. Wright, daughter of Robert R. Wright, mayor of Denver, has been chosen by the secretary of the navy to christen the new cruiser *Denver*, soon to be launched from the Neafie & Levy yard. Her builders desire to have this vessel in the water as soon as possible, so that they can proceed with the cruiser *St. Louis*, a craft more to their liking than torpedo boat destroyers and gunboats.

CUNARD COMPANY FIGURING ON FAST LINERS.

Engineering of London says that the Cunard Steamship Co. is with characteristic caution considering in all its bearings the question of 24-knot ocean liners. The company has asked three firms to submit three alternative designs for a vessel 700 ft. long and with speeds of 24, 23 and 18 knots per hour, along with an estimate of the first cost and information regarding crew and cost expenditure. In this way the company raised the whole question of whether the game was worth the candle. The *Campania* and *Lucania*, of 12,500 tons burden, to make 22 knots speed, develop 28,000 I.H.P. To make 23 knots would necessitate a large and more costly



THE BRITISH BATTLESHIP LONDON ON WHICH THE PRINCE OF WALES HAS JUST RAISED HIS FLAG AS ADMIRAL.

deep water and towed to the Erie Basin, Brooklyn. For a long period the future of the vessel was undecided, and only a short time ago her owners concluded to again place her in a seaworthy condition. This will be a very large repair job and it is hardly probable that the *Vigilancia* will be ready to take her place on the line before September.

On Sunday the Russian battleship *Retvizan* will be placed in commission. The ceremony will be interesting, having for its prominent feature the dedication according to the rites of the Greek church, without which no ship of Russia can raise her flag. A large force of workmen is employed on the *Retvizan* and her officers are anxious to get away from the wharf at Cramp's ship yard to an anchorage in the stream as soon as possible. Capt. Stchensnovitch, her commander, has experienced considerable trouble owing to desertions from his crew. He has the large number of 750 men on board, but even this is short of the full complement.

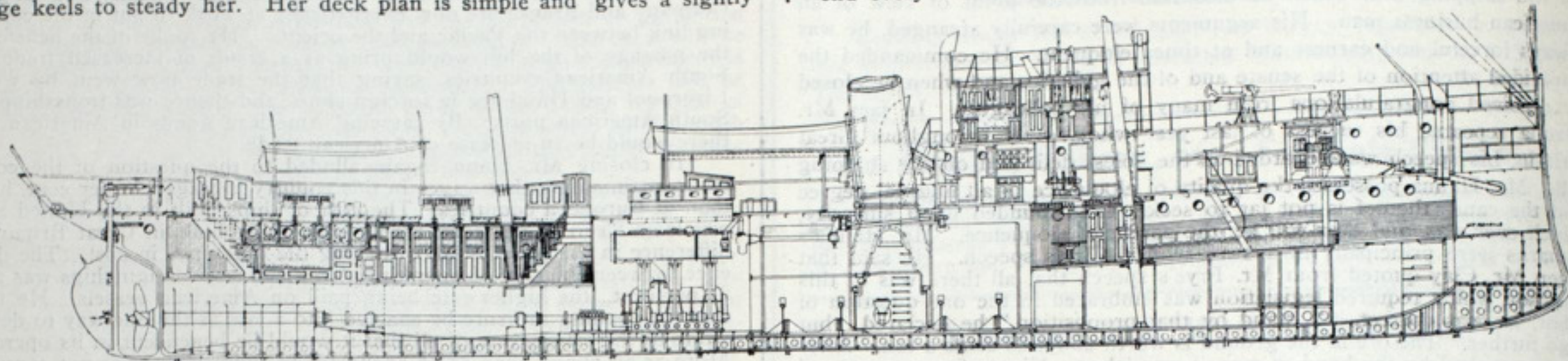
The Neafie & Levy Ship & Engine Building Co. will shortly launch the torpedo boat destroyer *Barry*, the last of the trio on which they have been working for nearly three years. The *Barry* follows closely the original design by the navy department, on which bids were asked. Her builders, and others interested, are not over sanguine regarding her prospects for success in the official speed trial, which will follow shortly after the launch. Twenty-nine knots an hour on the lines laid down is not thought

ship, besides an additional 8,000 I.H.P. while to make 24 knots it is estimated that a ship would require 48,000 I.H.P. It would thus come about that to add but two nautical miles to the hourly speed would mean an additional 290 tons of coal to be consumed daily. This would mean a consumption of 750 tons per day, or 1.3 tons per mile steamed. Engineering points out that an 18-knot steamship would consume less than half this amount of coal per day, while the expenditure on wages and engineering would be correspondingly lessened. It remarks, furthermore, that such a vessel could profitably carry a large cargo, as her machinery would require only half the weight and space of the swifter vessels. It does not pay to take cargo at a high speed. On the other hand, there is the opportunity of securing higher passenger rates. Many Americans insist on traveling on fast ships. There is also the factor of larger admiralty subventions made justifiable by the ships being an addition to the resources of the country in time of war.

A. Axton & Son, Brownsville, Pa., expect to launch the Monongahela river packet *Columbia* by April 1. She is 175 ft. long and 32 ft. beam. The Aubrey Lumber Co. built the cabin, and the engines of the steamer *Adam Jacobs* will be used.

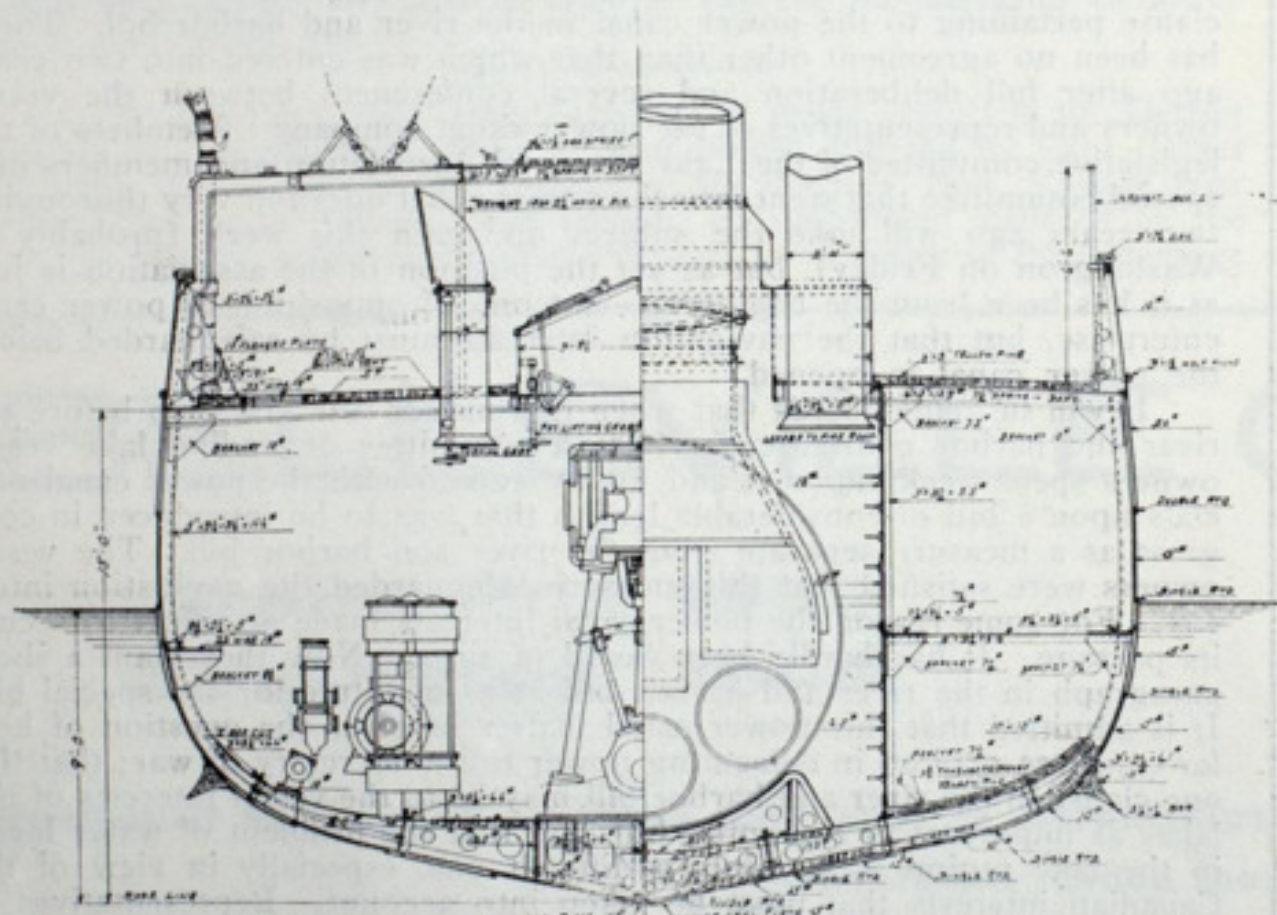
REVENUE CUTTER TUSCARORA FOR GREAT LAKES.

The United States revenue cutter Tuscarora, now under construction at the works of the William R. Trigg Co., Richmond, Va., for service on the great lakes, will be stationed at Milwaukee under the command of Capt. A. B. Davis. She is a steel ship 178 ft. over all, or about 65 ft. longer than the present station ship, the Morrill. She is therefore well within the Canadian canal limit for dimensions. The Tuscarora will have two boilers of the Scotch type, 12 ft. in diameter and 10 ft. long and each will be heated by three corrugated furnaces and carry a steam pressure of 175 lbs., which will give her all the speed she needs in her work on the lakes. She will be driven by a single screw and will be fitted with bilge keels to steady her. Her deck plan is simple and gives a slightly



LONGITUDINAL SECTION OF THE REVENUE CUTTER TUSCARORA.

vessel. Forward the deck structure will be flush. There will be a fore-castle deck running from the cut-water aft for one-third of the length of the ship, and on this will be the capstan, the anchor chocks and the rapid-fire gun. In the after end will be the wheel and chart house. Above the latter will be the bridge, which will be fitted with search light, speaking tubes, signal lines and other apparatus for bridge service. The berth deck will be a flush deck with the exception of the engine and boiler rooms, which will break the flush, and will have forward the fore-castle for the men, aft of that the steerage for the warrant officers, and aft of the engine room will be the ward room and cabin. The cabin will be fitted with



CROSS SECTION OF THE REVENUE CUTTER TUSCARORA.

staterooms, dining room and baths. The vessel will be lighted by electricity. The Tuscarora will have two masts, on which will be stretched four sails as auxiliary to the steam power. These sails will be two stay sails of the regular type and two triangular sails swung on booms. The revenue cutters will hereafter be named after Indian tribes and the selection of the name Tuscarora is in keeping with that policy.

NEW WARD LINERS—PHILADELPHIA SHIP YARD NEWS.

Philadelphia, March 12.—The action of the New York & Cuba Mail Steamship Co., better known as the Ward line, in placing an order for a new steamer with the Roach yard at Chester, has occasioned considerable surprise in ship building circles, as the Cramps of this city have been the builders of many fine steamships for that company of late, notably the Esperanza, Monterey, Havana, Mexico and Morro Castle. In every instance except the last mentioned the trial trips were an unqualified success. The Morro Castle met with a series of unfortunate breakdowns during preliminary runs to sea, but this is not thought to be the direct cause for the removal of this important work from Philadelphia. It is thought that some friction exists between the Ward line management and the Cramps, but in the absence of facts it is probably best to avoid discussion of rumors.

The order to the Roach yard is for a 5,000-ton freight and passenger steamer for the New York and Cuban and Mexican trade. It is believed that the Ward line contemplates, in addition to this vessel, the construction of two others of about the same tonnage. The residents of Chester are jubilant over the award of the new contract to the Roach yard. Chester was the birthplace of many of the old Ward liners, which are still in service and which have proved to be wonderfully seaworthy craft. The new vessel, to be delivered in the spring of 1903, will be a double-bottom steel steamship of about 400 ft. over all, 50 ft. beam and 33 ft. depth of hold. The hull will be divided into water-tight compartments, and the

vessel will be three-decked, with a hurricane deck above. There will be at least six bulkheads. The gangways and hatches will be numerous and will be placed in positions where the cargo can be taken in and out in the most expeditious manner. Twin screws will be employed and the indicated horse-power will be about 5,000.

The loss of the Red Star liner Waesland, of the International Navigation Co.'s fleet, which for years was a regular trader to this port, while deeply felt by her owners, will not result in any rush work on the Kroonland and Finland, now building for that company at the Cramp works. The Kroonland, launched Feb. 20, is proceeding towards completion at a rapid rate, and is booked to sail on her maiden voyage June 28. To this end every man it is possible to work on the vessel is employed. The

Finland is on the books of the International Navigation Co. to sail Oct. 4, although the date for her launch has not yet been set.

The new steamship Calvert, built by the Neafie & Levy company for the Chesapeake bay trade, has been delivered and is in service. The new vessel, built of steel, is 190 ft. long, 40 ft. beam and 12 ft. depth of hold, and has accommodations for 250 passengers.

The agitation for a new and direct steamship line to New Orleans has been again revived through the efforts of the Trades League of Philadelphia. N. B. Kelly, secretary of the latter, was sent south to interest the merchants of that section in the project, and he reports that all were unanimous in promising their support to the proposed line. Local shipping interests are much interested and predict a vastly augmented business with its advent.

Prince Henry of Prussia visited Cramp's ship yard on Monday, but no significance is attached thereto by local ship builders. At the invitation of the czar he inspected the recently completed Russian battleship Retvizan and took occasion to compliment the builders on the successful termination of their great undertaking. The prince was the recipient of a handsome souvenir from the Cramps in the shape of an album containing photographs and sketches of the many ships which have made the Kensington yard famous throughout the world. The cover of the album is designed and executed in sculptured leather. On a sunken center panel is worked a plastic model of the Russian cruiser Variag, the model being only 6 in. in length, but showing every minute detail of the ship. Taken as a whole the album is regarded as one of the most elaborate art volumes ever produced in this country. Prince Henry expressed amazement at the magnitude of the operations now under way at the ship yard and made favorable contrasts between the methods of doing work here and those in vogue in his own country. From one of the prince's suite it was learned that the German emperor specially commissioned him to inspect Cramp's ship yard and intimated that an order for a warship might not be a remote possibility. The Cramp company has nothing to say on this point and is similarly regarding the rumor connecting it with a proposed ship yard in Germany.

THE WORLD'S GREATEST WORKSHOP.

The over-sea trade of the British empire last year amounted to £1,500,000,000. The board of trade returns, published this week, show that the foreign commerce of the United Kingdom amounted to the stupendous total of £870,584,718. This is only £6,864,190 less than the total for 1900—£877,448,917—by far the highest hitherto recorded. There has been much published in the newspapers and magazines of late regarding the decline of Great Britain, but the actual figures are otherwise. Her methods have been represented as antiquated, but how can they be when her foreign trade last year was more than double that of the United States. Great Britain's foreign trade is £150,000,000 greater than it was six years ago and is now equal to £21 per head of population. In exports the result is not so satisfactory, the year showing a decline of £10,693,107, or 3.6 per cent. On the other hand the re-exports of foreign and colonial merchandise show a gain of £4,665,085, equal to 7.3 per cent. Following are the total exports and imports for the two years:

	1900.	1901.
Imports	£523,075,168	£522,238,986
Exports	291,191,096	280,498,889
Re-exports	63,181,758	67,846,743

The excess of imports over exports last year was £173,893,254, as compared with £178,000,000 in 1900, £165,000,000 in 1899 and £176,000,000 in 1898. Last year's returns, therefore, show a slightly reduced excess of imports, which becomes more striking when it is borne in mind that until the year 1900 new ships built for foreign countries were not included in English export returns. The value of these in 1901 was £9,159,876. When the war in South Africa and the unsettled state of trade conditions on the continent are considered the total of British commerce is simply marvelous. More business must have been done in 1901 than in 1900, for prices in 1900 were in many cases 20 per cent. higher than in 1901. This makes 1901 in volume the leading business year. These figures present much to contemplate. England is still the world's greatest workshop.

A bill to tax the iron mines of Minnesota 5 cents a ton, regardless of quality, has been killed in the Minneapolis senate.

NIAGARA RIVER DAM QUESTION.

Buffalo, March 12.—After a long sleep the project of damming the Niagara to raise the level of Lake Erie has been revived. I find that the vessel owners are generally in favor of the plan unless they happen to own land in the Buffalo creek district, in which case it makes all the difference in the world. It is a fact that the level of Buffalo creek is but a mere trifle higher three miles inland than it is at its junction with Lake Erie. The late freshet, that drove blocks of ice through the walls of houses in that district, makes the question an obviously complicated one, for if there are freshets after the dam is built the damage done will be paid by the government, or the sufferers will know the reason why.

One very plain improvement over the Corliss bill is the plan to include the Canadian government in the undertaking. So long as this was not done the local engineering interest was bound to oppose the measure, for it would be impossible to carry it out alone. The Canadian shore is very low for a great part of the entire distance and to flood it from this side would create a state of things that nobody would want to father.

Of course, everybody sees the selfish side of the plan. Tonawanda and the interests below the dam will have nothing of it unless it includes a completion and deepening of the ship canal down the Niagara, and they are doubtless right, for any obstruction at this point will increase the already dangerous current in the river, and it is already so bad that all effort to improve the upper river proper has about ceased.

If someone will come forward and show that it is possible to build a dam or some other obstruction that can be made bigger at one time than at another, the whole thing will be easy, but until that can be done there is going to be trouble. We already have too much water here occasionally and any sort of dam will increase the amount at such a time just as much as at any other, according to the theory.

One lake man is sure that the thing to do is to sink some pontoons at the mouth of the lake and then pump them out when the water comes up. He is no less positive that the thing can be done when the others laugh at him. Another plan is to set up some sort of an obstruction that can be swung on a pivot. When the water is low the longer side of the obstruction can be presented; when it is high let the shorter side be swung across the river. There is the usual chorus, though, that it will not do. That is to say that a definite plan and one that has been tested somewhere and found to work, is needed before the bill is a law and the work is in hand. Possibly the commission can fix up a plan that will be feasible, but it is a certainty that any device that is the same every day of the year will not be likely to save the low-lying shores from bad inundations, and then who is to pay the damages? The fact that Canada is in the scheme will complicate matters worse than ever. It looks as though Canada ought to be in favor of the plan, for the head of the Welland canal is often so shallow that nothing drawing more than 13½ ft. is allowed to enter it. There is a plan to deepen the canal from the lake to a point some distance below the first lock, but that will be very expensive and could be saved by a dam.

I find old lake men still saying that the level of Lake Erie, or of any of the others, is not permanently lowered, which means, if it means anything, that these lakes will come up again, just as Lake Superior has of late, and if they do a dam would be a great detriment to the shore dweller and the dock owner, while it would be of next to no benefit to the vessel owner. I am doubtful if the claim is a correct one, though there is the Lake Superior instance to favor it.

We are at the best very doubtful about the utility of the dam. Of course it would be easy to destroy a dam if it should be found worse than nothing, and we often have to learn what we know in that way, but we always avoid that method if we can. Who is to demonstrate the case?

JOHN CHAMBERLIN.

AN APPEAL FOR LAKE MASTERS.

Capt. Howard Patterson, president of the New York Nautical College, has sent the following letter, which is self-explanatory, to Senator M. A. Hanna:

"Will you permit me to appeal to you in behalf of a worthy body of men—masters and mates of steamships on the great lakes? An injustice has been done these gentlemen in a recent decision of the board of supervising inspectors of steam vessels. The latter contend that captains and mates having had experience only on steamships on our great lakes are not eligible for ocean licenses—that service on vessels navigating such inland seas does not enter at all into the question of seamanship. The board interprets thus harshly our generally elastic steamboat rules. It is a discrimination against deck officers of lake vessels, and one need only read the rules in relation to engineers of lake steamers to be fully satisfied on this point. Section 2, paragraph 14, reads:

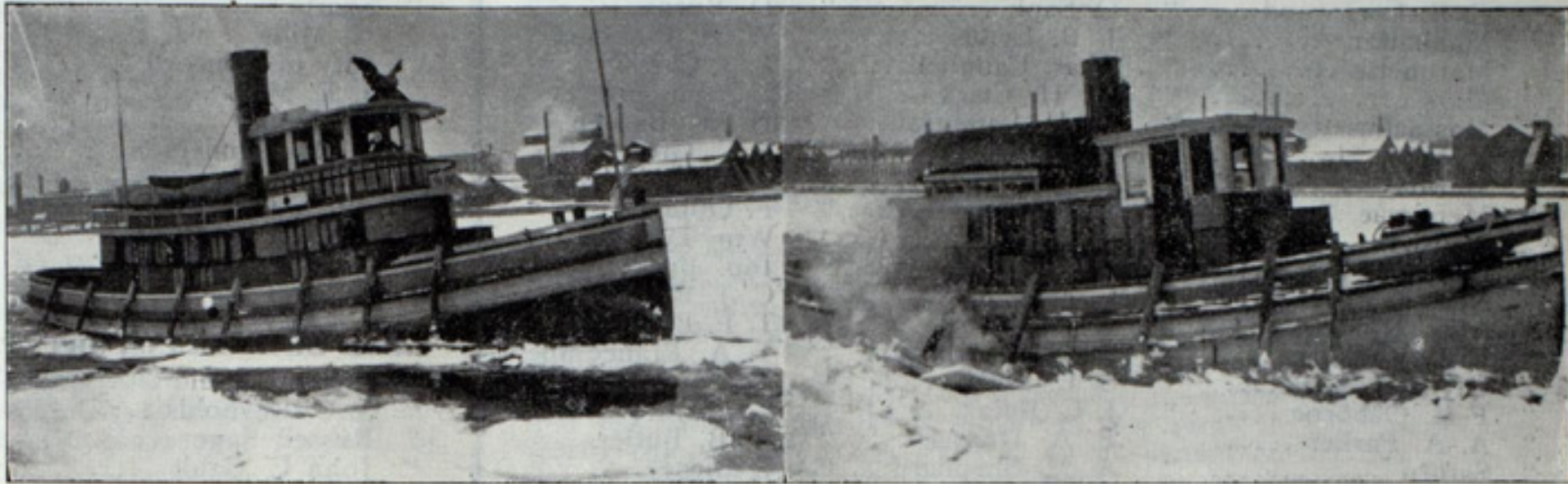
"Engineers of lake, bay, and sound steamers who have actually performed the duties of engineer for a period of three years shall be entitled to examination for engineer of ocean steamers."

"Now, despite his years of experience in command of lake steamships, a captain is denied the privilege and advantages of an ocean license, and although he is ready and competent to stand the same test in navigation and kindred subjects given to salt-water men, he is positively refused an examination. This is neither rhyme nor reason, for it requires the same seamanship, ability to handle a steamship, on the lakes as it does to handle one on salt water, and this I contend knowingly, as I have commanded vessels on both. When an applicant has studied navigation in all its branches, and is qualified in every way to navigate a ship with safety to any part of the world, it is the height of injustice to refuse him a license for ocean work simply because he has gained his experience on a vessel that floated in fresh instead of salt water. If this ruling is allowed

to stand, it will mean that the master of the largest and finest lake steamship afloat will be obliged to go to sea on salt water for three years at least before he can hope to get his license endorsed for ocean work. I write to you knowing you to be a steamship owner on the great lakes, asking if you will lend your powerful influence to the correction of this ridiculous condition of the rules in question?"

HOURS OF LABOR OF LAKE SEAMEN.

Editor Marine Review:—Would you kindly allow me enough space in your valuable paper to say a few words in regard to the hours of labor of lake seamen. Of late years lake traffic has kept pace with all modern and up-to-date requirements, except in the matter of shortening the men's hours of labor. They are just as long, if not longer, than they were years ago. I refer more particularly to boats in the ore, coal and grain trades. It is quite the common thing for the men to put in anywhere from eighteen to thirty and thirty-six hours loading at the ore docks. It will average up around twenty-four hours, and means pretty near continuous labor shifting the boat back and forth along the dock, and in the larger class of boats, handling trimming sections. That is not the worst feature of it. After putting in twenty-four or thirty hours loading,



HUDSON RIVER TUGS C. J. RENO AND GEO. C. VAN TUYL, JR., OWNED BY CAPT. ULSTER DAVIS, ALBANY.

The C. J. Reno is 65x16x6½ ft., built by Baldwin of New Baltimore, N. Y.; engine by Skinner & Arnold Co., Albany, is 14x16 in. Tug Geo. C. Van Tuyl, Jr., is 51x14x6 ft., built by Leroux of Albany; engine, McCuttee & Rodie of Rondout, N. Y., is 10x12 in.

one watch has to take her out, which means that one man has to steer for six hours more, if she happens to go out on the beginning of his watch. It is nothing short of physical agony to try and steer after a long spell of hard work and do it properly, to say nothing of trying to keep awake. You have got to steer just as good a trick as if you were fresh from your bunk; if you don't you will hear from the "old man" in short order. I claim further that it is endangering life and property, forcing men to steer under such conditions.

It is much the same in the coal and grain trades. At the unloading docks it is not quite so bad, unless the boat loads coal right away. Still eighteen hour drills are too common to be pleasant. I know that some people will think that all this is bordering on anarchy, but I still maintain that there is too little consideration shown for sailors' working hours. It is a common saying that a sailor's working day consists of twenty-four hours. I think some way of remedying this evil could be found, and I would like to hear from some of your readers on the subject. All this applies equally to steamers and tow barges.

Cleveland, March 9, 1902.

LAKE WHEELSMAN.

The Review, in publishing communications from its readers, does so with the distinct understanding that such publication does not, of necessity, imply an indorsement of the communication. As far as its own observation goes it believes that the above communication contains several errors of fact. As a rule a wheelsman's life is not a hard one, especially on the lakes. It is, in our judgment, an exaggeration to say that it means twenty-four hours continuous labor shifting a boat back and forth along a dock to load it. It is true that a boat may remain in port twenty-four hours or even more before she is assigned to an ore dock or an elevator, but the actual work of loading does not usually take over four or five hours. It does not follow that the wheelsman is working all the time in port. Of course when a boat leaves port the wheelsman may have to take his shift regardless of the fact that he may have been steadily working for some hours, and thus extend his day's labor, but not beyond the reasonable limit of physical endurance. If the Review errs in this it would like to be corrected.

RESTORATION OF THE CONSTITUTION.

A meeting, at which there were no remonstrants, was held in Boston a few days ago to take action upon the restoration of the Constitution to the condition which she occupied before the war of 1812. At present she is lying a pretty battered old hulk in Boston harbor, and if not restored in the near future will probably go to pieces. The cost of rebuilding her is estimated at \$300,000 and the sentiment was unanimous that the cost of the restoration should be borne entirely by the state of Massachusetts. Boston wants to retain her as a home institution and is not desirous that she shall be used as a training ship. If she were she would, of course, have to go to sea.

All the German steamship lines show heavy reductions in their dividends for 1901. The Hamburg-American line reports net earnings of 20,000,000 marks for 1901 as against net earnings of 23,800,000 marks in 1900, and has declared a dividend of 6 per cent in 1901 as against 10 per cent. in 1900. The Argo Steamship Co. has reduced its dividend from 8 per cent. in 1900 to 3 per cent. in 1901. The German Australian Steamship Co. paid a dividend of 8 per cent. in 1901 as against 12 per cent. in 1900, and the German-American Co., which paid a dividend of 10 per cent. in 1900, reduced this to 4 per cent. in 1901.

OFFICERS OF LAKE VESSELS FOR 1902.

GILCHRIST, J. C., Perry-Payne Bldg., Cleveland.

Str. Steel King	Capt. F. A. Goodell	Engr. Jas. Balfour.
" City of Genoa	" R. J. Walder	" Wm. Brake.
" City of Naples	" J. W. Baby	" R. D. Mayberry.
" City of Rome	" H. G. Hayberger	" T. F. Higgins.
" Columbia	" A. M. Williams	" M. M. Hill.
" Colonial	" Nelson Brown	" J. G. Fowler.
" John Craig	" Frank Howell	" F. Swarts.
" Cumberland	" W. F. DeLaney	" A. L. Hatch.
" C. A. Eddy	" E. D. Chilson	" S. Brant.
" C. W. Elphicke	" J. A. Nicholson	" C. Sharp.
" Gilchrist, (Steel)	" J. P. Minsky	" C. N. Albee.
" J. C. Gilchrist	" L. Stow	" Wm. Eddy.
" John Harper	" Ed. Mooney	" H. J. Hawthorne.
" F. W. Hart	" Ben Moshier	" Jno. Fritz.
" Helena	" F. H. Reed	" P. Shacket.
" Hiawatha	" D. Buie	" D. M. Foster.
" Jupiter	" F. A. Graves	" Ed. Reilley.
" Lake Shore	" Chas. Hahn	" H. Jesson.
" Lansing	" W. G. Rogers	" E. Harris.
" C. B. Lockwood	" C. Saph	" D. Burns.
" Manhattan	" J. B. Lyons	" W. H. Pinkham.
" Marquette	" Chas. Caughell	" P. J. Carr.
" Mars	" M. H. Clark	" J. Seymoure.
" Massachusetts	" W. H. Landgraft	" H. W. Barden.
" Mecosta	" T. J. Carney	" J. C. Grey.
" Merida	" A. C. May	" B. Beauchamp.
" Merrimac	" S. Markle	" F. Oullette.
" Neosho	" Peter Full	" Wm. Tyler.
" Neptune	" Chas. Hinsley	" Jno. Parks.
" Neshota	" C. M. Ennis	" C. J. Erickson.
" Alex. Nimick	" W. C. Butts	" T. F. Birch.
" E. W. Oglebay	" W. H. Hutchinson	" T. A. Francombe.
" Olympia	" S. E. Philp	" Peter Lamaar.
" F. M. Osborne	" J. C. Byers	" C. Clark.
" A. A. Parker	" F. A. Dupree	" R. B. Butler.
" Saturn	" A. M. Shephard	" J. Birney.
" E. N. Saunders	" W. G. Stewart	" E. Eagan.
" R. E. Schuck	" F. Hasenflue	" R. H. Reynolds.
" Sitka	" Alex. Clark	" W. T. Schwacofer.
" Siberia	" J. A. McDonald	" F. O. Burrows.
" V. Swain	" Geo. S. White	" J. W. Douglass.
" Tacoma	" Geo. Trotter	" G. Rogers.
" C. Tower	" F. Heaton	" Geo. Moore.
" Uranus	" Thos. Gibson	" A. F. Hogle.
" Venus	" E. L. Ennes	" C. Gumlick.
" Volunteer	" G. L. Cuddeback	" L. J. Manion.
" Wallula	" M. J. Madden	" H. Mitchell.
" C. W. Watson	" W. H. Blattner	" Jno. Maher.
" Waverly	" James Laird	" C. Martin.
" D. C. Whitney	" Frank Ott	" C. Murett.
" D. M. Whitney	" C. T. Gunderson	" C. A. Francombe.
" Geo. F. Williams	" Wilson McGregor	" T. Burns.
" A. P. Wright	" P. L. Millen	" G. Zanger.
" Yakima	" E. R. Morton	" Jno. Smith.
Schr. Antrim	" F. E. Johnson.	
" M. S. Bacon	" A. A. Munroe.	
" W. S. Crosthwaite	" Mathew R. Ross.	
" F. A. Geroger	" Jno. Mason.	
" Magnetic	" J. S. Jones.	
" Moonlight	" Fred Manuel.	
" B. W. Parker	" R. Jansen.	
" Angus Smith	" F. H. Lennon.	
" Twin Sisters	" Geo. Richards.	
" Tyrone	" E. Lohr	Engr. Wm. Marshall.
" Verona	" Jas. Kobel.	
" Yukon	" Lewis Bangs.	

MONTREAL TRANSPORTATION CO.,

Jas. A. Cuttle, Mgr., Montreal, Que.

Str. Bannockburn	Capt. Geo. Wood	Engr. Geo. Booth.
" Rosemount	" Alex. Milligan	" R. Taylor.
" Glengarry	" John Wood	" I. Boyd.
" Active	"	"
" H. F. Bronson	" Jos. Murray	" R. Hepburn.
" Glide	" T. J. Murphy	" M. Rankin.
" Jessie Hall	" Chas. Martin	" Geo. Tuttle.
" D. G. Thomson	" Jas. Murray	" Geo. Henderson.
Schr. Hamilton	" H. Colvin.	
" Quebec	" Jno. Phillips.	
" Minnedosa	" R. C. Irwin.	
" Selkirk	" H. Milligan.	
" Winnipeg	" H. Brooks.	
" Melrose	" Jas. Kirkwood.	
" Dunmore	" Robt. Gillies.	

WESTERN TRANSIT CO., Buffalo, N. Y.

Str. Arabia	Capt. H. L. Dennis	Engr. W. C. Gilbert.
" Auburn	" Edward Roberts	" C. L. Murray.
" Boston	" Henry Murphy	" P. Welch.
" Buffalo	" Robt. Murray	" Wm. McNulty.
" Chicago	" S. R. Jones	" Henry Hess.
" Commodore	" Thos. Slattery	" John Metke.
" Mohawk	" John Davis	" F. A. Miller.
" Montana	" John McKinnon	" Jas. Sangers.
" Rome	" F. D. Osborn	" Wm. Tibby.
" Syracuse	" John Fisher	" John W. Mark.
" Troy	" Donald Gilles	" M. J. Laney.
" Vanderbilt	" F. J. Johnson	" F. W. Hale.
" Yonkers	" M. Folan	" J. W. Rainey.

CALVIN CO., THE, Garden Island, Ont.

Str. India	Capt. James Dix	Engr. Thos. Smith.
" D. D. Calvin	" Chas. Coons	" Jno. Kennedy.
" Chieftain	" John Doyle	" Thos. Gray.
" Parthia	" David Lefavre	" Geo. Sauve.
" Frontenac	" Edward Phelix	" Chas. Le Riche.
" Johnston	" John Harris	" Herbert LaRush.
" Bluebell	" John Dix	" Wm. Sauve.
Schr. Burma	" H. N. Smith.	
" Ceylon	" Jno. Ferguson.	
" Augustus	" Jos. Achee.	

DETROIT, BELLE ISLE & WINDSOR FERRY CO., Detroit.

Str. Pleasure	Capt. John Wilkinson	Engr. N. Huff.
" Promise	" Robt. Ferguson	" Henry Free.
" Sappho	" Geo. D. Horn	"
" Garland	" M. McCune	"
" Fortune	" J. Damase	" Fred. Wolff.
" Excelsior	" Archie Bains	" S. G. Merrill.
" Victoria	" Peter Williams	" Walter Merrill.

MILLS N. & B., Marysville, Mich.

Str. Havana	Capt. Thos. Deringer	Engr. C. B. Keeler.
" Sparta	" Alex. Johnson	" H. Smith.
" N. Mills	" Dan Warwick	" C. J. Trumble.
" City of Concord	" J. R. Inches	" Chas. Babcock.
" J. E. Mills	" T. A. Ellery	"
Schr. Biwabik	" Chas. Ludwick.	
" Alex. Anderson	" James Edwards.	

PEAVEY STEAMSHIP CO., Duluth, Minn.

Str. Frank H. Peavey	Capt. C. C. Balfour	Engr. Jas. Patterson.
" Geo. W. Peavey	" W. C. Brown	" A. L. Roberts.
" F. B. Wells	" L. W. Stone	" H. L. Wetter.
" F. T. Heffelfinger	" L. A. Rand	" Theo. A. Meyers.

LAKE ERIE TRANSPORTATION CO., A. W. Colton, Mgr., Toledo, O.

Str. Geo. J. Gould	Capt. W. M. Cottrell	Engr. Geo. A. Butler.
" S. C. Reynolds	" T. C. Herrick	" Jas. H. Miller.
" Russell Sage	" Geo. H. Burnham	" J. Kohlbrenner.
" John C. Gault	" C. H. Lewis	" Jno. Busted.

OLGA TRANSPORTATION CO., E. G. Reisterer, Mgr., Tonawanda, N.Y.

Str. John C. Pringle	Capt. A. P. Gallino	Engr. J. N. Burns.
Schr. Ben Harrison	" Phil. Hepner.	
" Sweetheart	" T. McDermott.	
" Unadilla	" J. B. McDermott.	

ST. LAWRENCE & CHICAGO STEAM NAV. CO., Ltd.,

J. H. Hagerty, Mgr., Toronto, Ont.

Str. Algonquin	Capt. Jas. McMaugh	Engr. S. Gillespie.
" Rosedale	" W. H. Wright	" J. A. Findlay.
" New, not named yet	" Jas. Ewart	" E. J. O'Dell.

WHITE STAR LINE, B. W. Parker, Gen. Mgr., Detroit.

Str. Tashmoo	Capt. B. S. Baker	Engr. W. Dubois.
" Greyhound	" Thos. Macklen	" D. Maxwell.
" City of Toledo	" J. J. Stover	" M. J. Gilligan.

THOMSON LINE, C. W. Thomson, Mgr., St. Clair, Mich.

Str. City of Holland	Capt. F. J. Meno	Engr. Jos. Meno.
" Pilgrim	" E. Haywood	" Henry Meno.
" Douglas	"	"

HOPE TRANSPORTATION CO., J. A. Francombe, Mgr., Detroit.

Str. W. R. Stafford	Capt. B. Chamberlin	Engr. J. A. Francombe.
Schr. Ed. McWilliams	" Alex. Sharron.	

BOYNTON, L. R., Mgr., Island Trans. Co., St. Ignace, Mich.

Str. Algomah	Capt. G. W. Boynton	Engr. R. McLaughlin.
" Wau-Kon	" A. R. Graves	" Jno. Bickie.

BOYNTON, L. R., Mgr., Mackinac Trans. Co., St. Ignace, Mich.

Str. Sainte Marie	Capt. L. R. Boynton	Engr. R. Walsh.
" St. Ignace	"	" J. Rosseau.

LIVINGSTONE, WM., Detroit.

Str. T. W. Palmer	Capt. Geo. T. Stilphen	Engr. R. B. Hodge.
" Livingstone	" Wm. McAlpine	" Jas. Morrison.

JEAN, AUGUST, Buffalo.

Str. Samuel Marshall	Capt. Aug. Jean	Engr. W. H. Phillips.
Schr. Tilden	" M. McCoy.	

LEE, A. R., Gen. Mgr., Star-Cole Line Steamers, Detroit.

Str. Arundell	Capt. B. Armstrong	Engr. J. S. Robertson.
" Idlewild	" Jos. Lockridge	" C. H. McCarten.

MILLS TRANSPORTATION CO., Port Huron, Mich.

Str. Gogebic	Capt. Wm. D. Neal	Engr. E. Weyner
" Newaygo	" Jas. Fleck	"

DRAKE, BARTOW & CO., Cleveland.

Str. Alcona	Capt. W. T. Sutherland	Engr. A. J. Millet.
Schr. Alta	" J. McNamara.	

OHIO COOPERAGE TRANSPORTATION CO., Cleveland.

Str. Monohansett	Capt. D. A. Kendall	Engr. E. T. Everill.
Schr. Lizzie A. Law	" Ernest Warner.	

ATLAS COMMERCE CO., 516 Perry-Payne Bldg., Cleveland.

Str. R. R. Rhodes	Capt. Wm. Humphrey	Engr. Wm. Huber.
-------------------	--------------------	------------------

LUDINGTON, L., Alpena, Mich.

Str. Alaska	Capt. L. Ludington	Engr. H. Carter.
-------------	--------------------	------------------

SOUTH SIDE LUMBER CO., Chicago.

Str. Felix Sawyer	Capt. W. H. Evans	Engr. Wm. Hendey.
-------------------	-------------------	-------------------

The newspapers have it, but it has not as yet been verified, that the Cunard line is to build two great steamships of 25 knots speed and that the Hamburg-American line is to build a steamer 725 ft. long and to have a speed of 25 1/4 knots.

AROUND THE GREAT LAKES.

Madden & Donnelly of Saginaw have sold the steamer A. E. Shores to the Lake Shore Saw Mill & Lumber Co. of Cleveland.

The Goodrich steamer Iowa passed through the Sturgeon bay canal on March 10. The opening is the earliest in twenty-seven years.

Ship carpenters and calkers at the works of James Davidson, West Bay City, are on strike. The men claim that their wages are lower than exist anywhere else on the lakes.

The steel barge Australia of the Corrigan fleet, Cleveland, has been successfully docked in the new Ship Owners' dry dock at Chicago, where she will be converted into a steamer.

The Craig Ship Building Co., Toledo, is making an extension to its dry dock. When completed the dock will be 500 ft. long, 90 ft. wide and will have 16 ft. of water over the sill.

Capt. Joseph Shackett died at his home in Port Huron last week. He was well known and had been for many years captain of the steamer Wotan. He was sixty-three years old.

The name of the Western Transit Co.'s steamer Milwaukee has been changed to Yonkers. It is thought that the steamer building at Chicago for the Western company will be named Milwaukee.

The coal loading plant of the Cincinnati, Hamilton & Dayton Ry. Co.'s docks at Toledo will be equipped with a McMyler car dumping machine, which is to be ready for operation by July 1.

The Penberthy Injector Co. of Detroit has purchased five acres of land adjoining the Michigan Central tracks on Greenwood street, upon which it proposes to erect a new plant in the near future.

Martin Lynch, superintendent for a number of years of the locks at the Sault, was killed a few days ago near Tuscaloosa, Ala., where he was superintending the construction of locks on the Warrior river.

Simon Langell of St. Clair has sold the wooden steamer Oscar T. Flint to A. W. Comstock and Oscar Sinclair. The Flint will be converted into a lumber carrier at once. She will carry about 1,000,000 ft. of lumber.

Two more steamers, the F. R. Buell and Wyoming, have been chartered by the Port Huron & Duluth Steamship Co., to engage in regular service during the coming season between Port Huron and the head of Lake Superior.

Barry Bros. of Chicago, who were said to have made preparations for competing with the Detroit & Cleveland Steam Navigation Co. between Cleveland and Detroit during the coming season, have definitely abandoned their intention of doing so.

The Electrical Service & Supply Co. has closed a deal with the Detroit & Cleveland Navigation Co. for the installation of wireless telegraphic apparatus on board the steamer City of Detroit when she makes her first trip during the coming season.

Iron mines of the Gogebic range are being pushed to the limit of production. It is reported that the amount of ore loosened and on the surface prior to the opening of navigation will aggregate 1,400,000 tons. More men have been employed on the range this winter than ever before.

Wharfage which the Detroit & Cleveland Navigation Co. and the new Detroit & Buffalo Transit Co. will have at Detroit, as soon as present improvements are completed, will be among the finest on the lakes. The docks and warehouses will have a water frontage of 1,000 ft. and a depth of 240 ft.

A case growing out of a collision between the steamers Elphicke and Poe in the St. Clair river near Sarnia last season was tried and argued in the United States district court at Cleveland this week. The Elphicke was represented by Goulder, Holding & Masten, and the Poe by Hoyt, Dustin & Kelley.

Capt. John Mitchell, manager of the Cleveland Steamship Co., has decided to give the name James Gayley to one of the new 6,000-ton steamers that he will have in commission during the coming season. Mr. Gayley is in charge of the ore and transportation business of the United States Steel Corporation on the lakes.

The United States government has begun action at Duluth against Capt. James Davidson of Bay City to recover for damage done to the breakwater extension at Two Harbors last summer by the steamer Shenandoah. The government alleges that the repair work for the damage done the crib work amounted to \$4,012.50.

Charles Beyschlag of St. Clair, Mich., and Capt. Henry Leisk of Milwaukee, who recently sold the steamer P. J. Ralph and barge Harold to the Calbick Transportation Co. of Chicago, have bought a one-third interest in the steel steamer America of the Drake & Maytham fleet, Buffalo, and Capt. Leisk will command the steamer hereafter.

It is reported from Detroit that the Arnold Transportation Co. of Mackinaw has sold to F. W. Wheeler for \$160,000 the fast passenger steamer Iroquois, which was built recently at the Craig works, Toledo. The Arnold is to be used on Lake Superior next season, but information regarding the particular service in which she will be engaged is withheld for the present.

Bateman, McDougal & Palmer, who have built up at Buffalo quite a large business in repairs to steel and wooden vessels, have been arranging of late to undertake the construction of new vessels. They are negotiating with Toledo parties for the building of a passenger steamer, to run between Toledo, Put-in-Bay and Sandusky. The new vessel is to be of steel and about 175 ft. over all by 32 ft. beam.

Capt. D. D. Gaillard, United States engineer at Duluth, has received the following proposals on a dredging job at Portage lake ship canals that involves the removal of about 360,000 yards of material: Buffalo Dredge Co., Buffalo, N. Y., \$70,480; L. P. & J. A. Smith Co., Cleveland, \$73,050; James Pryor, Houghton, Mich., \$45,470; Duluth Dredge & Dock Co., Duluth, Minn., \$48,030; Samuel O. Dixon, Milwaukee, Wis., \$71,750.

Dispatches from Chicago have noted the success of vessel interests in the United States district court in three cases against the drainage canal trustees, all involving damages on account of obstructions or excessive current in the Chicago river, due to operations of the canal management. The decisions of the district court are all very favorable to the vessels,

but it is not at all probable that the drainage canal interests will stop with the district court. They have too much at stake. The cases will undoubtedly be appealed.

F. H. Clergue of Sault Ste. Marie, Ont., was in the market some time ago for three or four 5,000-ton steamers, or steamers and consort, to carry ore during the coming season from his mines at Michipicoten to Lake Erie ports. The negotiations contemplated either outright charter for a lump sum or purchase. Mr. Clergue's wants have been supplied, but there are conflicting rumors as to the vessels he secured. It was first said that he had chartered two of the Davidson wooden tow barges that are already in commission, together with the two steel steamers which the American Ship Building Co. is building for Edward Carter of Erie. Now it is reported that all four of the vessels are from the Davidson wooden fleet—two steamers, Rapahannock and Sacramento, and the two new barges nearing completion at West Bay City.

Two more of the lake tow barges that went to the Atlantic seaboard three years ago—the John C. Fitzpatrick and Wadena—are in trouble. A dispatch from Chatham, Mass., announces that they are ashore with coal cargoes on what is known as Shovelful shoal; that there is hope of releasing the Fitzpatrick, but that the Wadena will probably prove a total loss. Cargoes are insured, but the vessels are not insured. The vessels were in tow of the tug Sweepstakes when they stranded. The Sweepstakes was released and put into Vineyard Haven, but is considerably damaged. The Sweepstakes, Wadena and Fitzpatrick, as well as the barges W. D. Becker and Annie M. Ash, two other lake-built vessels in the Atlantic coast coal trade, are owned by the Boutell Towing & Wrecking Co., in which W. H. Mack, W. D. Becker, Capt. John Mitchell and others are stockholders.

SENATOR DEPEW ON THE SHIPPING BILL.

Senator Depew addressed the senate on the shipping bill during the week. He presented figures to show that the arguments of the opponents of the bill as to the prosperity of American ship yards are not well founded. The coastwise trade and the foreign trade are confused to a surprising extent. The ships that are building in the seaboard ship yards are for the coastwise trade. He declared that vessels aggregating 85,000 tons had been constructed in American ship yards for the foreign trade during the past ten years, while in Great Britain during one year—the last year available in statistics—1,500,000 tons of ships had been constructed. He suggested that the difference between these figures was so extraordinary that the opposition senators ought to post them up in their committee rooms as a constant reminder of the decline of the American merchant marine.

"Give us the means," said Mr. Depew, "by which American ships may be run under the American flag, and then we will build the ships in competition with foreign ship yards."

The New York senator said he did not know whether Mr. J. Pierpont Morgan had purchased the Leyland line of ships or not, but if he had it was because the line could be operated at a profit. He did not know anything concerning the statement that Mr. Morgan had expressed no intention of bringing the vessels under the American flag and giving them an American register. Mr. Morgan and those whom he represented, said Mr. Depew, were acute business men. If they could afford to fly the American flag on their vessels they would do so, but they could not be expected to fly the American flag when by so doing they would be forced to run their ships at a loss.

During the past decade, Mr. Depew said, \$3,300,000,000 had been invested by American capitalists in manufacturing industries. Vast sums had been invested in railroads and mines. Similar immense sums had not gone into American shipping because figures could not be produced which would show the investor that he could get his money back, not to mention a fair return upon his investment. Mr. Depew referred to the subsidies paid by Great Britain, Germany and France as having contributed to the extension of the merchant marine of those nations. "One of the most enlightened or progressive rulers of the old world," said he, "is the present emperor of Germany. Within the last ten years he has brought Germany to practically a unanimous support of subsidies by which the German merchant marine has rapidly overtaken that of Great Britain."

In conclusion Mr. Depew said: "Within five years, if the expectations of this bill are realized, then for this comparatively small expenditure of \$7,500,000, this reproach that American ships are scarcely seen in foreign ports, will be removed. Then, again, the American flag floating over American steam and sailing vessels will be seen in every port of the world; then with the American flag and American skipper will come the American commercial agent and the American financial exchanges, and we can have the methods for the competition in which we believe we should be more successful than any other nation, but which is as yet only a dream and a hope."

The freight situation in the Pittsburgh iron district shows very little improvement, and prominent railroad officials who have charge of the movement of the immense tonnage in that territory are not making any glowing promises to manufacturers as to what they will do when the weather moderates. The fact is that the railroads have not sufficient motive power and cars to move the tonnage, and even if they had their poor track facilities would continue to be a barrier. Several of the traffic managers of the largest steel plants predict that the situation, so far as Pittsburgh and the adjacent territory is concerned, will be worse than any thus far experienced, and with the diversion of cars into the grain trade during the summer and fall months little encouragement is offered. It was firmly believed that with the improvement in transportation facilities which usually comes in the spring months the operation of blast furnaces and steel plants would greatly improve and the strain on raw materials would be removed. It seems, however, that such is not to be the case.—Iron Trade Review.

In the death of Mr. W. A. Boole, San Francisco has lost one of its prominent ship builders. Mr. Boole was the head of the firm of W. A. Boole & Son. He was a Nova Scotian, having been born at Shelbourne seventy years ago. He studied ship building in Boston and went to San Francisco fifty years ago, where he started a ship yard. He developed quite an extensive enterprise, the firm now employing about 400 men.

SCOTTISH SHIP BUILDING LETTER.

Glasgow, Feb. 22, 1902.—The annual meeting of the British Corporation for the Survey and Registry of Shipping was held here this week. It was presided over by Mr. Nathaniel Dunlop of the Allan-State line. Mr. Francis Henderson of the Anchor line was appointed chairman of the committee of management for the ensuing year. Mr. Dunlop explained the character and object of the corporation with a view to removing the misapprehension of those ship owners who have not yet joined it, although partaking of the benefits it has conferred on shipping. The British Corporation was established eleven years ago to secure that the load line question should be wisely settled, and that the laws relating to the assignment of load line should be so administered that life and property on the seas might be preserved without sacrificing the usefulness of the carrying ship, and without risking the transference of the carrying trade to foreigners, who are not subject to our load line laws. In this it has rendered, and continues to render, unobtrusive and incalculable services to shipping, the usefulness of which the government cheerfully recognizes. But this was only, as Mr. Dunlop explained, one step in the work to which the founders of the corporation set themselves. They resolved to bring the highest achievements of science to the help of the ship builder, and the rules for ship construction which they devised and which constituted the corporation's building rules were the result. These rules, which were attached to the corporation's register, were not only those that regulate building, but they had become the model upon which the more recent improvements in the rules of ship construction all the world over had been framed. Ship owners should in greater numbers than heretofore rally round the institution and give to it that support it so much deserved, securing its permanence and obtaining from it those great advantages it was capable of yielding. Many of the largest and best ships in the mercantile marine had been built to its rules, and had their place in its registry. The book contains upwards of 1,500,000 tons of shipping, and the corporation has assigned load lines to about 2,500,000 tons. The adaptability of its rules to variations of form has enabled the ship architect to effect improvements in structural design freed from the limitations that formerly prevailed. They could point to the turret class of vessels, which had almost wholly been built under its supervision, as evidence of this, and at present the corporation has in process of construction an improved system of water ballasting, designed to overcome the disadvantages that attach to the ordinary cellular and deep-tank systems. These improvements are well worth the attention of owners of the cargo-carrying types of vessel. The finances of the corporation have been well maintained, and the ships presently building to its rules, though not as numerous as could be wished, are ample for its needs. The staff continues to be upheld in numbers and efficiency, and their surveyors may now be found at every important port in the world. It is noteworthy, too, that men have been found during all these years to form the committee of management—ship owners, ship builders, marine architects, engineers, and underwriters—and that they have given their services without regard, save that which springs from the knowledge that they are doing something for the maintenance and advancement of the trade and commerce of the country.

Great interest is being taken here in the trials of the armored cruiser Good Hope, the first of which was completed at Spithead a few days ago with very satisfactory results. She is the latest of the many additions to the navy by the Fairfield Co., Glasgow, and is the first of the class to complete her trials. With a displacement of 14,100 tons, she will be required to run 23 knots for eight hours, for which purpose the twin engines are designed to develop 30,000 I.H.P., the greatest power ever got in a warship. But at the first trial the engines were only required to indicate one-fifth of the maximum with a view of determining the coal consumption, which was found to average for thirty hours 1.87 lbs. per horse power per hour, the mean power being 6,054 I.H.P., average revolutions being seventy-one. Only twelve of the boilers were in use. Everything worked well, and no attempt was made to determine the speed of the ship as she is to proceed on a separate series of progressive speed runs. The recent trial was a thirty hours' run at 22,000 H.P., with engines giving most satisfactory results. The next trial will be a full power one of eight hours' duration.

In the navy estimates just presented to parliament provision is made for the following new ships to be commenced in the fiscal year 1902-3 (in addition, of course, to those for which the contracts are now being adjusted), viz., two battleships, two armored cruisers, two third-class cruisers, four scouts, nine destroyers, four torpedo boats and four submarines. Only one of the two new battleships will be laid down in the government dock yards, and also one of the two armored cruisers, but the machinery of both will be built in private works. All the other vessels will be given out to contract. Thus private ship builders will get a battleship, an armored cruiser, two third-class cruisers, four scouts, nine destroyers, four torpedo boats, and four submarine boats. The design of the large ships has not yet been settled. The four scouts are to be designed by the contractors on the lines of the destroyers, but much larger and not so fast. In the French navy there are somewhat corresponding vessels, known as Estafette cruisers, which, on a length of 256 ft., displace 896 tons, and are driven at 23 knots by engines indicating 7,000 H.P. The Russian new vessel Novik has a length of 347 ft. 8 in. Her beam is 40 ft. and draught 16 ft. 5 in. She has thickened steel (nearly 2 in.) for protecting the machinery, while her engine power, 18,000 I.H.P., gives her a speed of 26 knots. She carries 900 tons of coal, and thus can run 900 miles at full speed and 5,000 miles at 14 knots. These two foreign vessels are to be improved upon. The nine new destroyers will resemble the ten now under consideration on tenders from private firms. In their case 125 tons of dead weight must be carried on board during the trial, as compared with 35 tons in existing boats, the idea being to give them a much greater radius of action. The engines are to attain the power necessary with a number of revolutions not exceeding 350 per minute. The trials to be made with Parsons steam turbine, in combination with triple-expansion reciprocating engines for low speeds, may yield results to encourage more extensive use of this system. The experimental destroyer with this machinery is already launched, and will soon be ready for exhaustive trials. The four torpedo boats will be of the same type as the 25-knot craft under construction. The four submarine

boats will doubtless be ordered from Vickers Sons & Maxim, who built the last lot.

An important new departure is to be made in the new battleships, the tenders for which are now being considered by the admiralty under the 1901 program, in the matter of armor plating. These new battleships, to be named respectively King Edward VII., Commonwealth and Dominion, will be far ahead of any ship constructed for the British fleet, the only one vessel to compare with them being the Japanese battleship Mikasa, built by the Vickers company. The main broadside armor of the new British ships is to be carried to the upper deck, so that all broadside guns on the main deck will be completely protected by the armor of the citadel. This was the system in the old broadside ironclads, but with this difference that in the modern ships each 6-in. gun is isolated within armor walls, which run partly athwart the ship as "traverses" with others parallel to the skin plating forming square casements for each gun. The new British ships will excel the Japanese Mikasa in the thickness of plating, due to their larger total displacement, for while the Mikasa is of 15,200 tons these new vessels are to be of 16,350 tons. This main belt will be between 21 ft. and 22 ft. deep, extending 5 ft. below the water line. In the Duncan the depth is only 14 ft., in the Majestic 15 ft., in the old Inflexible only 15 ft. 8 in. Over 70 per cent. of the bulk of the new ships will be protected by belts, whereas in the Majestic the proportion of the length armored was 55 per cent., in the Admiral class 43 per cent., and in the Inflexible 34 per cent. The water line belts in the new ships will be 9 in. thick in the citadel, reduced by stages to 4 in. at the ends. For the length of the citadel the thickness will be 8 in. from the main belt up to the level of the main deck, and from the main deck to the upper deck 7 in. The division bulkheads between the 6-in. guns on the main deck and the longitudinal armor walls behind the guns will be of hardened steel.

Some idea of the increased power of the armor is given by the statement that, while only about 15 per cent. of the displacement is given up to armor in these later ships, the proportion in the Royal Sovereign, which was not so effectively armed in the upper works, was 20 per cent., her armor being of a compound type. In the old Inflexible, with a citadel only one-third the length of the ship, the proportion was 20.8 per cent., but her armor was of wrought iron 24 in. thick, as against the 18 in. of the Royal Sovereign, and the average of 8 in. steel in the King Edward VII. The two pairs of 12-in. guns which are to be mounted within barbettes placed at the forward and after end of this citadel, are to have 12-in. armor with 6-in. hoods. There will be turrets for the four 9.2-in. guns, one at each corner of the citadel, with 4-in. armor, which will have the additional protection afforded by the broadside armor and the very heavy athwartship bulkhead constituting the forward and after walls of the main citadel in the new ships.

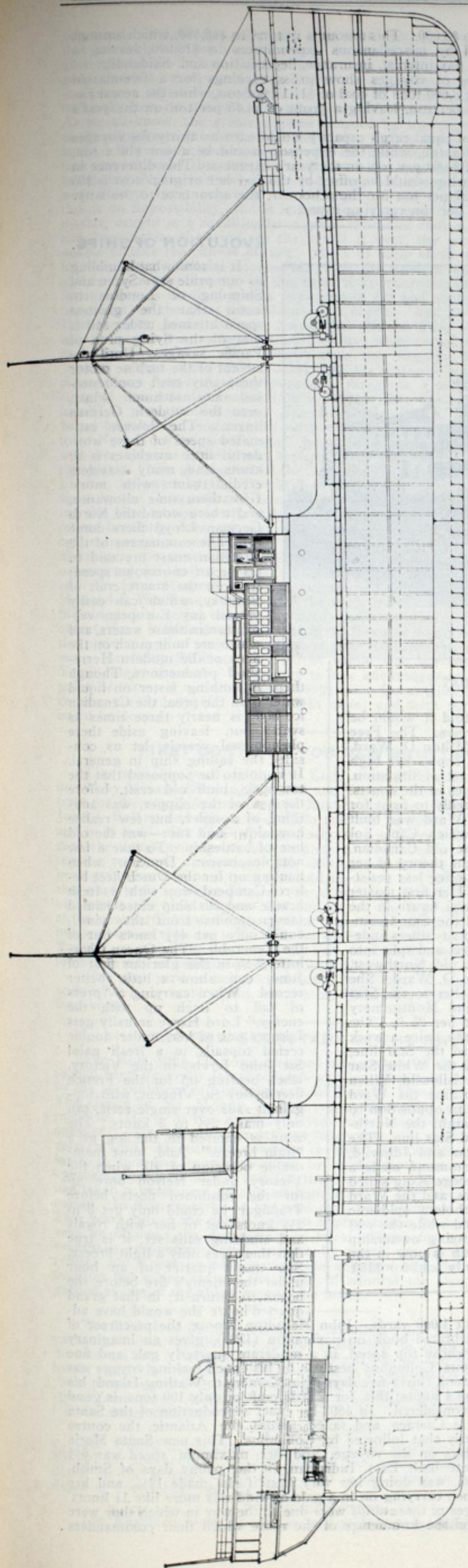
These new ships are to have twin-screw engines of the triple-expansion four-cylinder type, with one high-pressure cylinder 33½ in., one intermediate 54½ in., and two low-pressure cylinders 63 in. in diameter, with a stroke of 48 in. They will develop their power when running at 120 revolutions, using steam of 250 lbs. pressure. Sixteen boilers of the Babcock & Wilcox types will be fitted in two of the ships, while in the third there will be fourteen Babcock & Wilcox boilers and six cylindrical boilers, the steam pressure in this case being 45 lbs. less at the engines, the tank boilers necessitating a reduction in the initial pressure to 210 lbs. as compared with 270 lbs. in the ships having only water-tube boilers.

The five armored cruisers for which contracts are about to be placed are to be of a modified County type, with a slight increase in length to enable a different type of boiler to be used, and also to allow of 7.6-in. guns to be used in each turret at the forward and after end of the vessels, instead of twin 6-in. guns as in some of the preceding ships. These new vessels will be 450 ft. long, 67 ft. beam, whereas the original County ships were 440 ft. long and of 66 ft. beam, the moulded depth being increased 1 in. to 38 ft. 4 in., with the same draught, 24 ft. 6 in. The displacement is thereby increased from 9,800 to 10,200 tons, but it is anticipated that the same speed of 23 knots will be attained with engines indicating 22,000 H.P. The change in boilers has necessitated the increase in displacement as greater space and greater weight have to be accommodated, 1,832 tons being the lowest estimate for the four alternative types of boilers proposed, as compared with 1,750 tons in the case of the boilers of the original ships. The engines are the same, the high-pressure cylinder being 37 in. diameter, the intermediate 60 in. and the two low-pressure 69 in., the stroke being 42 in. It is not yet known how many of the new vessels are to be built on the Clyde, where the orders will be very welcome this year, seeing that new contracts for merchant ships are still few and far between.

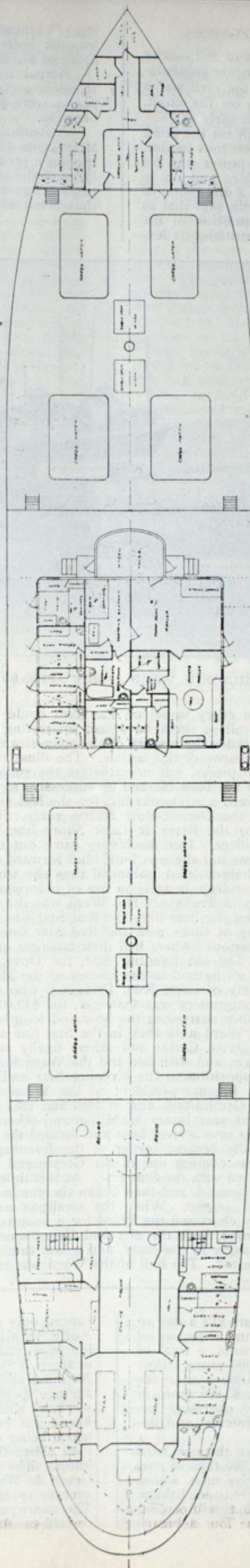
ANNUAL MEETING OF CANADIAN MARINE ENGINEERS.

At the third annual meeting of the National Association of Marine Engineers, which was held in Toronto lately, the president was authorized to organize a deputation to wait on the government with reference to the following matters: That all tug boats should carry licensed engineers; that British steamers running in Canadian waters should be compelled to carry at least two licensed engineers; that no temporary certificate or permits be issued to any who are not fully qualified engineers; that United States vessels purchased for use in Canada should not be brought in free of duty; that while the present law makes no distinction between ocean, lake and river side-wheel boats, smaller shafts are desirable on steamers navigating rivers only. The following were elected and installed as officers for the ensuing year: Grand president, T. J. S. Milne, Kingston; grand vice-president, O. L. Marchand, Montreal; grand secretary-treasurer, N. J. Morrison, St. John, N. B.; grand conductor, F. S. Henning, Toronto; grand doorkeeper, Samuel Beatty, Collingwood; grand auditors, Robert Craig, Toronto; and James Gillies, Kingston.

In the course of his statement before the house committee on naval affairs, Rear Admiral Bradford strongly urged the installation of apparatus for wireless telegraphy on some of the ships of the navy for purposes of instruction. Admiral Bradford still insists, however, that the field of usefulness for wireless telegraphy is limited and is practically confined to the sea. The apparatus is by no means perfected. It will not work in very hot weather. After the heat of the day is passed, however, messages can be sent without difficulty. Foggy weather seems very favorable to the transmission of messages. Admiral Bradford was very earnest in his recommendation that the ships of the navy be equipped with wireless telegraphic instruments.



ELEVATION.



STEEL SCREW STEAMER FOR THE PACIFIC COAST LUMBER TRADE.

LUMBER CARRIER FOR THE PACIFIC.

It was announced in the Review, a few weeks ago, that J. J. Lynn of Port Huron had been instrumental in organizing a company for the transportation of lumber on the Pacific coast. It is now understood that A. B. Hammond, the Marcus Daly estate and Mrs. C. P. Huntington are interested in the enterprise. A contract for the first vessel has been placed with the Newport News Ship Building & Dry Dock Co., Newport News, Va. The plans, prepared by Capt. F. D. Herriman of the Bureau Veritas and Great Lakes Register, Cleveland, involve a novel feature in the arrangement of hatches. It will be noted from the drawing on this page that the hatches run fore-and-aft on both port and starboard sides. This is done in order to admit of the work of loading and unloading the vessel being carried on from both sides in slips specially constructed for that purpose. The vessels are to trade from San Francisco to Eureka in the red wood lumber district of the Pacific.

This first steamer will carry 1,500,000 ft. of lumber on 15 ft. 8 in. draught and will cost, when ready at San Francisco, \$200,000. Dimensions are: Length, 256 ft. over all; 240 ft. keel, 41 ft. beam, 20 ft. deep. Engines will be triple-expansion, 18, 28½, 48 in. by 40 in. stroke, supplied with steam from two Scotch boilers, 13 ft. in diameter and 12 ft. long. The vessel will have stateroom accommodations on the poop deck for twenty passengers. The construction of the ship at Newport News will be supervised by agents of the Bureau Veritas at that point.

SHIP BUILDING IN HOLLAND.

The Dutch ship building returns for 1901 show that that industry is still in a flourishing condition in Holland and also that Dutch ship yards are largely patronized by English and German ship owners. The following is a list of the principal orders executed last year: At the Fyenoord yard, Rotterdam, three steamers of 2,360 tons for the Dutch mercantile marine and one cruiser for the navy; Bonn & Mees, Rotterdam, one steamer of 2,000 tons and several vessels of small tonnage, all for Dutch owners; Wilton, Rotterdam, several tug-boats, eleven boilers and three sets of marine engines, on Dutch, German, Belgian and Swedish account; Rykee & Co., Rotterdam, one steamer of 2,000 tons, two dredgers and one ferry-boat, all for Holland; Delftshaven, Rotterdam, eight tug-boats for British and Dutch owners; A. Smulders, Slikkeveer, several dredgers (suction and others) for Brazil, China, Chili and Belgium; De Schelde Maatschappij, Flushing, one steamer of 3,597 tons for Holland and two vessels for the state; Gebroeders Bood, Leiderdorp, twenty-nine lighters, four of them of more than 600 tons; Nederlandsche Scheepsbouw Maatschappij, Amsterdam, three steamers, one of them of more than 5,000 tons, and one tanker, all for Dutch owners; J. Smit, Ablasserdam, two steamers of 4,780 tons for Dutch owners; Gebroeders Jonker, Kinderlijke, five lighters, two of them of over 1,200 tons, for Germany and Holland; N. Bernard, Amsterdam, 103 vessels measuring altogether 21,000 tons; Gebroeders Pot, Bolness, twelve ocean barges for England and four lighters of 1,200 to 1,700 tons for Germany and Holland; Wed. C. Boele, Slikkeveer, several small steamers for Holland and four lighters of 900 to 1,700 tons for Germany and Holland; M. Vanderkuyl, Slikkeveer, three lighters of 1,400 to 1,700 tons for Germany and Holland; A. J. Otto, Krimpen, several craft among others three lighters of 1,300 tons each for Holland; A. Vuyck, Capello, eleven lighters of 300 to 1,700 tons for Holland and Germany; C. Van der Giesen, Stormpolders, sixteen lighters of 750 to 1,800 tons each for Germany and Holland; Gebroeders Bodewes, Sobith, seven lighters of 1,000 to 1,600 tons each for Germany; J. Meyer, Faltbommen, two steamers and four ocean barges for British owners, and four lighters of 450 to 1,700 tons each for Holland and Germany; H. Bodewes, Millingen, a number of lighters of 300 to 1,360 tons each; P. Ruytenburg, Waspik, several lighters of 200 to 1,600 tons each; H. Wiegerinck, Nijmegen, three lighters of 1,000 to 1,850 tons each; W. Bodewes, Martenshoek, three lighters of 600 tons each for Germany, one lighter of 900 tons for Belgium, three lighters for Holland and two three-masted schooners of 400 tons each for Denmark; E. Smit, Hoogezand, one three-masted schooner and several lighters for Germany.

POPULARITY OF THE SCHOONER.

The schooner-rigged vessel is now the distinctive type of sail carrier in the coasting trade. Schooners of great burden, however, are comparatively a recent product on the coast. Up to the time of the civil war a schooner of from 200 to 300 tons was considered large on the coast, though the first three-master on the great lakes was built as early as 1850. It was thirty years later that the first four-master was built on the coast and vessels of schooner rig began to run up to 1,200 to 1,500 tons in size. The first five-master afloat that kept the seas of her own power was the schooner Governor Ames, built in 1889 at Waldoboro, Me., and up to three years ago she was the only schooner of her class. In a discussion of the advantages of a schooner the Boston Commercial Bulletin says that as compared with the full-rigged sailing ship there is no question of the superiority of the multimasted schooner. The cost of construction is less in the case of the schooner; she carries less than half the crew required by the ship; she carries an enormous spread of canvas and can outpoint and outfoot any square-rigger afloat; and, finally, she can carry a great cargo. As to the standing of these schooners when compared with the ordinary type of steam cargo tramp, there is a necessity of more careful investigation. The average cost of construction per ton carrying capacity of four schooners—four and five-masters—from which data have been compiled, has been \$25. The cost of two steel freight steamships built in American ship yards in 1900 with a capacity for 5,300 tons of cargo was \$55 per ton carrying capacity. The cost of running the schooners, as derived from statements rendered by the agents over a series of voyages covering a year's time, was \$7 per ton carrying capacity. The cost of operating the steamers was greater than this owing to the larger crew carried, higher wages necessarily paid, cost of coal for consumption in their engines and greater charge for depreciation, insurance and interest. It amounted to \$30.50 per ton carrying capacity.

The advantage a cargo steamer has over the multimasted schooner of the same capacity is in the increased number of trips it can make in a given time. The actual figures show that the tramp steamer can make about three times as many trips in a year as a five-masted schooner engaged in steady business. About one-half the time the schooner will equal the steamer's record in spite of the latter's quicker despatch, while the other half of the year its voyages will be twice as long. On the year's business about twice as much business is handled by the steamer as by the schooner.

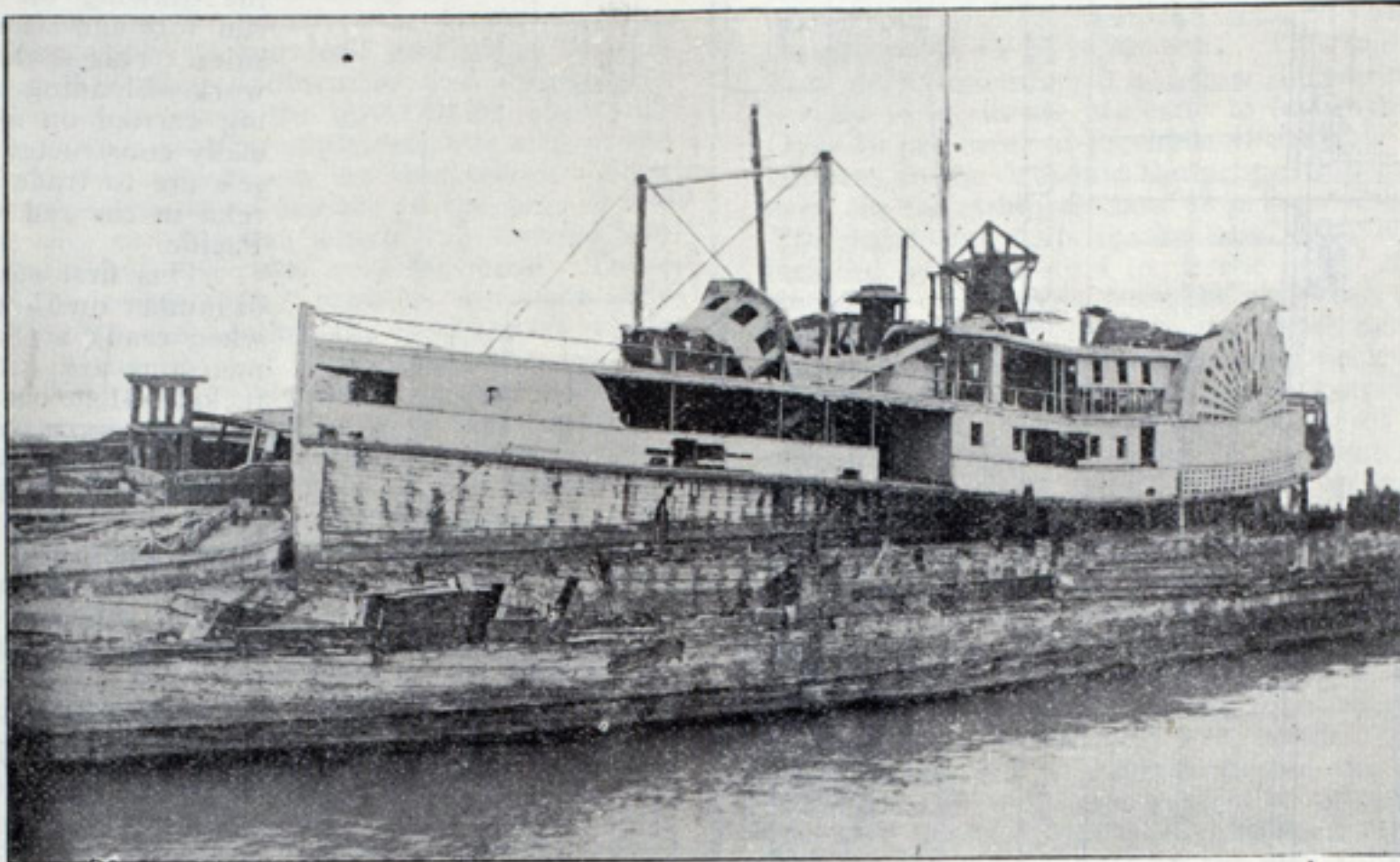
The ordinary coasting cargo tramp steamer will make thirty-six trips in a certain trade in a year. The one we have in mind can carry 2,500 tons of coal per trip at say 65 cents a ton, giving her gross receipts of \$57,200 in the year. She is afloat on an average 200 days in the year, burning 20 tons of coal a day, at a cost of \$2.50 a ton, or \$10,000 for the year. She carries a crew of twenty-four, whose wages amount to \$1,200 a month or \$14,400 for the year. It costs \$12 a day to feed this crew or \$4,400 for the year. There are incidental expenses of \$600 a month for paint, repairs on deck and in engine room, a total of \$7,200 for the year. The stevedoring will amount to \$6,300 more. Port charges, insurance, commissions and agent will cost \$5,000 a year additional. This adds up to \$47,300 and there will easily be \$3,000 more in miscellaneous expenses, making a round total of \$50,000 operating expenses, thus leaving a profit of \$7,200 to pay insurance, interest and depreciation and dividends.

A five-masted schooner of 2,258 gross tons will make thirteen trips where the steamer is making thirty-six. She will carry 3,600 tons of coal at 60 cents, earning \$28,080. Her crew will consist of twelve men, whose wages will amount to \$6,000 a year. It will cost only \$1,500 to feed them. Incidental expenses all summed up may amount to \$4,000, this including commissions, agents, insurance, repairs, port charges, etc. The stevedor-

ing will amount to \$5,000. This amounts in total to \$16,500, which amount may be increased by miscellaneous expenditures to \$18,000, leaving a profit of \$7,740 to pay interest, insurance, depreciation and dividends.

Actual figures of voyages show gross earnings for a five-masted schooner carrying 3,600 tons of coal of \$11.11 per ton, while the actual expenses were \$6.66 per ton, leaving a profit of \$4.45 per ton on the year's business.

A steamship of equal cargo capacity would earn on thirty-six voyages at 60 cents \$21.60 a ton, while the expenses would be about \$16 a ton, leaving a profit of \$5.60 per ton on the year's business. This difference in favor of the steamship would be offset by the fact her original cost is \$55 per ton against \$27 per ton for the schooner, the advantage to the latter thus being \$26.40 per ton carrying capacity.



THE MILTON D. WARD AS SHE APPEARS TODAY.

If the story of every vessel on the lakes could be told it would be found that nearly all of them have had interesting careers. The Free Press of Detroit relates the history of the river steamer Milton D. Ward, whose picture accompanies this article. The illustration shows her high and dry, falling to pieces, but nevertheless the subject yet of litigation. The Ward's career has been marked by successive struggles in the courts. She has, indeed, lived a strenuous life, for she had repeatedly to fight for the supremacy of the Detroit-Port Huron route. The Ward was built at Marine City for the River & Lake Shore line, of which Capt. Sol Gardner was president. Her machinery came out of the old Canadian. When she first came out she was built bluff forward on the theory of her designer, Capt. Blodgett, that fashioned thus she would offer less resistance to the water, riding, in fact, on top of it forward. Her first master was Capt. Lathrop of Trenton. The Ward was the central figure in the early fights between the Star line, the Red Star line and the Star-Grummond line, running at times with the Red Star line and at others independently as the various owners had their business quarrels and split into opposition lines. The old Evening Star, the Dove, the old Northwest, later the Idlewild, all figured in the history of the Milton D. Ward. She became the property of Capt. John Pridgeon, who sold her to the Star line, of which Montgomery was manager, for \$49,000, and Montgomery rebuilt her, made her sharper at the bow and lengthened her 25 ft. The Evening Star and Ward were then in the Star line and ran twice a week to Port Austin. David Carter and others finally secured the Star line, bought the Saginaw, and with her and the Ward formed the White Star line and ran in opposition to the Evening Star and the Idlewild. When George McMillan became president of the White Star line the Ward was sold to Steve Grummond, and in 1886 and 1887 ran in opposition to the Star line. Next year James McMillan and others bought the Northwest, converted her into a river boat and formed the Red Star line. The Red Star line finally became owner of the Evening Star and Idlewild, and previous to the coming out of the Greyhound, Grummond made a deal to run the Ward with the Star line. At this time George King sailed the Ward for Grummond, and then began the cut in rates, and the Ward was laid up for a season. When the smallpox and cholera epidemic broke out, the city chartered the Ward for a hospital, and while she was thus used she burned, both the city and Grummond denying ownership on account of a tangle in the lease, and a law suit, which is now in the higher courts, resulted. The hull of the Ward was recently sold for \$150.

vanced only about 1,000 yards. John Hamilton Moore, the precursor of Norie, in his celebrated book on navigation (1796), gives an imaginary log of a trader, whose top speed, in a moderate quarterly gale and fine weather, is 8½ knots. Columbus' best run on his epoch-making voyage was 200 miles and he took thirty-five days from Gomera to Watling Island; his average speed was 4 knots; this, for a little craft of only 100 tons, is good work, all things considered. In 1893 an exact reproduction of the Santa Maria was built at Carraca, and sailed across the Atlantic, the course taken being exactly that followed by Columbus. This new Santa Maria took thirty-six days on the voyage, and her maximum speed was 6½ knots. The frigate built East Indiaman, in the palmy days of Smith, Green & Wigram, was doing her very best if she made 12½, and her average speed when carrying on in a gale of wind was more like 11 knots. The smart passages of these ships were due to the way in which they were carried on to, and the knowledge of the route which their commanders

EVOLUTION OF SHIPS.

It is somewhat humbling to our pride says Syren and Shipping of London, to know that the greatest speed attained under sail is that of the flying proa of Pacific savages. Until the advent of the turbine motor these tiny craft could out-sail any steamer afloat, even the modern German liners. The lowest estimated speed of these wonderful little machines is 20 knots, and many travelers credit them with more. Give them time allowance, and where would the North German Lloyd fliers come in? The catamarans of the Brazilian coast are said to go at an enormous speed; so, too, the smart craft of Bombay, which can easily outsail any European vessel seen in those waters, and which are built much on the lines of the modern Herreshoff productions. Though there is nothing faster on liquid water than the proa, the Canadian ice-boat is nearly three times as swift; but, leaving aside these phenomenal vessels, let us consider the sailing ship in general. It is not to be supposed that the towering, bluff old craft, before the era of the clipper, was anything of a sailer, but few realize how slow—and sure—was the old line of battleship. To take a few notable cases: Duncan, when hauling up for the Dutch fleet before Camperdown, with a fresh breeze and his ship close hauled (seven points from the wind), could only get 4½ knots out of the Venerable. The Queen Charlotte, before the glorious first of June, can show a little better record. When carrying a "press of sail to fetch up with the enemy," Lord Howe actually gets 7 knots out of her, under double reefed topsails in a fresh gale! Sir John Jervis, in the Victory, when bearing up for the French fleet before St. Vincent, with top-gallant sails over single reefs, can only make 2½ to 3 knots. The wind is entered in the log as a "light breeze." And, most memorable occasion of all, when the Victory under Nelson bore up for the combined fleets before Trafalgar, he could only get 3 to 2½ knots out of her with royals and studding sails set; it is true that there was only a light breeze. She was a quarter of an hour under the enemy's fire before she began to return it; in that grand quart d'heure she would have ad-

possessed. A 1,000-ton ship, with a crew of sixty, can be sailed in a way that a weakly-manned vessel cannot. Some of our huge modern "four-posters" can do at least 2 knots better than the above-mentioned speed, and, if such a vessel as Messrs. Duthie's Port Jackson, one of the handsomest iron sailers that ever floated, were to be sailed with a full crew able to handle her, no doubt a still greater speed than 15 could be obtained. As we all know, the greatest speed attained by trading vessels was that of the clippers in the Australian and China trades, and on the North Atlantic. It was with these craft as with the coaches, their greatest perfection was ended by the incursion of steam. But it must always be remembered that their crews were large and composed of seamen, and that they were able to carry on; with the incompetent and weak crews of today this is an impossibility, and it is too often the case that a modern four-master, caught in a squall under a great spread of canvas, has to up-helm and keep before the wind till the squall is over, the crew being utterly unable to take the canvas off her. Many of these small wooden clippers, for they were small by comparison with the modern sailing ship, were able to do their 18 knots. Of this there is no question; the Flying Cloud, for instance, is credited with a day's run of 433 and another of 427. The Sovereign of the Seas has 419 to her credit. And besides these, the Dreadnought, James Baines, Swordfish, Marco Polo and others were equally swift. But, as before said, they had large crews, and were driven as no ship is driven now. Then came the steamer, and though the "flying" China could only do her 300, yet a steady ten days' Atlantic passage was better than any possible average in a sailing vessel. The story of the Atlantic record (for it is here that the fastest vessels are found) is pretty well known. The Britannic of 1874, which wonderful vessel beat her previous record on her 233rd voyage, doing her Queens-town-New York trip in 7 days 7 hours 30 minutes, and is still running with her original boilers, was replied to by the Arizona of 1879. Then the Alaska ("the greyhound of the Atlantic"). Later on the Umbria and Etruria, followed by the Teutonic and Majestic, which were followed again by the Campania and Lucania; here England at present stops, leaving the blue ribbon of the Atlantic in the hands of the Germans. For record-breaking does not pay under present conditions; the enormous coal consumption and the army of firemen required, make the running of 23-knotters too expensive. When the turbine and oil fuel have come into oversea use we shall see—what we shall see. At present it would appear as if the limit of speed for large vessels had been reached, but Messrs. Harland & Wolff are credited with the wish to build a craft of 50,000 tons! Should such a vessel ever be required, and should extreme speed be the object, there is little doubt but that 26 to 28 knots could be obtained with the present type of engines. But the coal consumption would be enormous (probably 3,000 tons a trip) as would also the running expenses. Yet it might some day be greatly to our advantage—from the imperial point of view—if we could run troops over from Queenstown to Vancouver, via Sydney (C. B.), in eight days; and with such a vessel this could be done.

FIRST CONTRACT FOR NEW SHIP YARD.

The new ship yard on the St. Clair river (Columbia Iron Works), owned by Messrs. Duncan, Botsford and Jenks of Port Huron, has a contract for the construction of a steel lumber steamer. The new boat is for John J. Boland and others of Buffalo and will be 200 ft. long, 39 ft. beam and 16 ft. hold. Mr. C. O. Duncan, who was in Cleveland a few days ago, says the company expects to complete a vessel before the close of the coming season of navigation. Pile driving and dredging operations have been going on for some time past and the work of building shops for the ship yard tools is about finished. It is probable that S. F. Hodge & Co. of Detroit will build engines and boilers for the first vessels constructed at the new yard. According to present plans two large steel steamers of the hopper bottom type are to be built for the lake service of the Grand Trunk Railway, in which the owners of the ship yard are interested; also a small lumber vessel, in addition to the contract above noted.

This ship yard is being established on a tract of fifty acres of land, with 1,700 ft. of water front, on the St. Clair river, just below the Oak-land house.

THE NEW SECRETARY OF THE NAVY.

The Hon. John D. Long resigned as secretary of the navy this week, as had been generally foreshadowed, and his place was immediately filled by the appointment of Congressman William H. Moody of Massachusetts. The choice of Mr. Moody for this responsible office is generally commended. He is of the Roosevelt type—clean minded, clear headed and energetic. Mr. Moody, who is forty-nine years old, graduated from Harvard in 1876. He entered congress in 1895. Speaker Reed took a great fancy to him and encouraged him by an appointment to the important appropriations committee, and for the last three congresses Mr. Moody has taken a prominent part in all legislation to meet the expenses of the nation. In that capacity he has paid particular attention to naval affairs. Two years ago in the debate over an appropriation for hydrographic surveys he opposed the detachment of naval officers for survey work, but eventually supported ocean surveys by naval vessels on their regular cruises and it was he who secured the adoption of a rider on an appropriation bill which revived the grade of admiral for Dewey. He is regarded as one of the ablest men in the house.

The Bath Iron Works, Bath, Me., launched a few days ago the steam yacht Pantooset, building for Albert S. Bigelow of Boston. The yacht's dimensions are: Length, 212 ft. over all; 175 ft. on the water line, 27 ft. beam, and 16 ft. 6 in. deep. She is rigged as a two-masted schooner. The yacht is equipped with a triple-expansion engine, which is supplied with steam from three Almy water-tube boilers. She will cost, when ready for sea, about \$225,000.

The United States senate has passed a bill appropriating the sum of \$30,000 for the acquisition of a suitable site upon which to establish a depot for the revenue cutter service. It is the intention to establish the depot at Curtis bay, near Baltimore.

The Keystone Drop Forge Co. will erect new works in Chester, Pa.

SENATOR VEST OPPOSES THE SHIPPING BILL.

Senator Vest of Missouri addressed the senate in opposition to the shipping bill, following the speech of Mr. Hanna. He was listened to with the closest attention, and despite his evident feebleness spoke with great energy. He carefully analyzed the measure and particularly attacked the present navigation laws, which he declared were relics of barbarism and responsible for the decline of our merchant marine. Mr. Vest began by comparing the details of the pending bill with those of the postal subsidy act of 1891 and showing that in the pending bill it was proposed to increase the subsidy because it was claimed by the majority that the present postal subsidies were not sufficient to achieve the result hoped for from the present pending bill. The senator declared that 73 per cent. of the subsidy which would be received by ships on the Atlantic would go to the International Navigation Co.—the American line. The pending bill, he said, would take money out of the treasury of the United States without giving anything of value in return for it. The vessels would get the subsidies whether they carried a single postal card or not. He said that Mr. Frye and Mr. Hanna had presented roseate pictures of the additional commerce which the United States would acquire through the operations of the proposed bill, claiming that trade would follow the mails. As a matter of fact, the mails followed the trade; that had been proved by the history of the world.

He declared that the pending bill provided for a "pure, naked, and unadulterated subsidy," and said it was defended on the ground that with the subsidy the American merchant marine could compete with the subsidized ships of European maritime powers. He denied "emphatically and distinctly" that such would be the result of the bill's operation. England, he asserted, had 53 per cent. of the ocean-carrying trade of the world. He denied that England paid subsidies to her vessels. He declared that Great Britain paid the steamship lines for carrying the mails, the sums paid being dependent upon the number of pounds of mail carried. Most of England's ocean commerce was carried by her tramp steamers, and not a penny of subsidy was paid to any of them. The only real subsidy which Great Britain paid, Mr. Vest said, was \$300,000 a year to the owners of certain vessels which could be called into use as auxiliary cruisers in time of war, if they were deemed necessary.

Mr. Vest sharply criticised the provision of the pending bill looking to the improvement of the deep-sea fisheries. He said the senator from Maine (Mr. Frye) proposed to take \$175,000 a year from the taxpayers for the benefit of New England's deep-sea fisheries. He thought New England ought to be satisfied with the legislation for her special benefit already on the statute books. Mr. Vest criticised the majority of the commerce committee for eliminating from this bill the provision which required a subsidized ship to carry at least 50 per cent. of her cargo capacity on any voyage upon which she was to receive subsidy. The majority, he explained, had held that the provision was of "doubtful constitutionality." He had read a letter from the Hon. George F. Edmunds taking the ground that such a provision was not unconstitutional.

Mr. Vest further along urged that if the "shipping trusts" were to be subsidized there was no reason why the farming industry and the mining industry, too, should not be subsidized. The senator from Maine (Mr. Frye), continued Mr. Vest, with his usual courage and frankness, had said that subsidy meant protection. "And he might have said truthfully," said Mr. Vest, "that protection meant subsidy." The manufacturers of this country, he said, were protected by a tariff of 35 per cent. against the pauper labor of Europe, and yet they sent their products to these very pauper labor countries and sold them from 20 to 50 per cent. lower than they sold them to our own people. Mr. Vest maintained that ships could be built in this country as cheaply as they could be built anywhere, and that the contention of the majority to the contrary was not well founded. He made a vigorous attack on the navigation laws of the United States, declaring that they were responsible for the decline of the merchant marine. They embodied, he asserted, a semi-barbaric system which even China had thrown aside. They had weighed down the merchant marine until it amounted practically to nothing. The remedy was to abrogate the navigation laws and permit citizens of the United States to buy their ships where they could buy them cheapest. No subsidy would enable them to do that. He asserted that if the democratic party should regain power no ship subsidy would be permitted to remain on the statute books. Mr. Vest said if this subsidy is given it will be but the beginning of the end and will result in a monopoly equal to that of the Standard Oil Co. He did not make any pessimistic prophecy, he said, but he was sure that the dream of a revived shipping painted in such gaudy colors never will be realized. Mr. Vest concluded by saying that he hoped the time would come when the glory and power of the United States would be greater than that of any other people on earth. "But it will not come," he said, "from unequal and unjust discrimination in favor of one interest against all others."

Mr. Tillman followed with a speech on the same bill. He declared that the bill would foster monopolies, and incidentally referred to the proposed incorporation of the United States Ship Building Co., which would absorb the large ship yards of the country. Speaking of the use of vessels in case of emergency by the government, Mr. Tillman said he would cite, as a commentary on patriotism and love of country, the fact that the four scout ships, St. Paul, Paris, New York and St. Louis, used during the Spanish war, cost the government \$2,864,835, and these, he said, had been subsidized under a pretense that they would serve us in time of emergency.

Announcement is made by President Theodore C. Search of Philadelphia that the seventh annual convention of the National Association of Manufacturers will be held in Indianapolis April 15, 16 and 17. President Search announced at Detroit last year, when he consented to accept the presidency for the sixth time, that he could not serve the association in that capacity beyond the expiration of the present year. Mr. Search has recently made known his adherence to this determination, and one of the most interesting problems which the Indianapolis convention will have to consider will be the selection of a new president. This matter has been quietly discussed among the members for several months, but at present there is nothing to indicate upon whom the choice of the association will fall.

CANADA WANTS SHIP YARDS.

Great steel ship yards and a fine merchant marine are objects toward which Canadian enterprise is moving. But, as in the United States, enterprises of this character need governmental encouragement. A deputation of Ontario ship builders waited on the Dominion government recently to plead for more favorable conditions. The Bertram Engine Works Co., the Polson Iron Works Co., both of Toronto, and the Collingwood Ship Building Co. were represented in the deputation. From the yards of these companies a number of fine vessels for service on the great lakes have been turned out in the past few years and they have on hand contracts that will keep their works engaged for some time. But it is complained that in certain of the laws affecting ship building there is not only no encouragement but positive hindrance to the industry. It would be more profitable and would expand, thereby building up the lake marine, if a few alterations were made. There is first the question of registration of vessels not built in Canada. Vessels having a British register are free to enter Canadian waters and carry on a traffic between purely Canadian points. This operates against the growth of a distinctly domestic marine. The Canadian ship builders do not ask for any protection against this competition of British vessels, but they petition for an equalization of terms. The British ship builder gets all his materials at the lowest cost, unburdened by import duties. The Canadian ship builder has to pay import duties on many of the articles entering into the construction of his vessel. To balance that difference against the Canadian ship builder it is proposed that a rebate be allowed. At present there is a rebate for duties but it is deemed too small, being \$1.15 to the registered ton. The ship builders think it ought to be \$4 per ton. This is how they would even up accounts as between them and the British ship builder.

Then there is the question of foreign vessels not of British registration. Sometimes a vessel is bought in the United States and transferred to the Canadian side to carry between ports there. Such vessels, unlike those having British registration, are not admitted free to this domestic trade, but are subject to a duty of 10 per cent. on their hulls and 25 per cent. on their machinery. It is pointed out, however, that these duties afford little protection to Canadian ship builders and Canadian ship owners, for the reason that the American vessels purchased are generally old ones, whose value for duty is always put down low. A higher ad valorem rate or a specific duty on a scale of tonnage is recommended. With effective protective duties against vessels of a foreign register, and with an adequate rebate for duties paid on material and to compensate for the free competition of vessels having British registration, the ship builders believe their industry would expand.

Indeed, according to a recent judgment of Justice Burbridge, in the exchequer court, it appears that the item of the tariff relating to foreign made ships of other than British registration is of no effect, and that consequently such vessels are free of duty. The Algoma Central Railway Co.—one of the Clergue corporations, with headquarters at Sault Ste. Marie, Ont.—registered the steamboat Minnie M. at that port. The customs collector there demanded \$3,500 duty, because the vessel was of American make and had not British registration. British registration could have been obtained at the cost of a voyage to another British colony, namely, to Newfoundland, but that method was not resorted to. The duty was paid under protest, and the collector, who is authorized by the imperial acts operative in Canada to grant registration papers, issued the necessary documents. Proceedings were begun by the Algoma Central company to recover the duty, and were successful. The exchequer court ordered the money to be returned. This finding was not due to any conflict between the Canadian customs act and the British shipping laws, but entirely to the defect of the Canadian statute to express its intent. The fourth section of the tariff act provides that "there shall be levied and collected" duties as set forth in the schedule following upon all "goods enumerated" or "referred to as unenumerated," when "such goods are imported into Canada or taken out of warehouse for consumption therein." The provision to impose the duty ought, Justice Burbridge considers, to be embodied in the schedule instead of being cut off from it. A ship does not come within the definition of goods as given in Section 3 of the tariff act; "neither," says the judge, "can a ship with propriety be said to be imported, and it would be absurd to refer to it as taken out of warehouse for consumption in Canada." Therefore, he held, while "it was the intention of parliament to impose the duties mentioned in the schedule, no authority but parliament could supply the omission and make the act effective for its purpose." Of course, the ship builders want the wording of the act changed, so as to tax foreign vessels not of British register.

In regard to another matter the deputation made strong representation. This was in reference to supposed laxness in the administration of the coasting laws. By Section 2, chapter 83, of the revised statutes of Canada, it is provided that "no goods or passengers shall be carried by water from one part of Canada to another, except in British ships," and save in the case of vessels belonging to a foreign nation whose navigation laws permit Canadian vessels to ply between its ports. In 1899 the Canadian government suspended this law for the season, in order to enable the American vessels to assist in carrying the grain from Fort William to other Canadian ports of the lower lakes. Last year it gave permits to American tugs to tow saw-logs from the mouths of Canadian lumber streams to Canadian points on the lakes where there are saw-mills. At present, it is said, American vessels are participating in the Canadian coast to coast business. To this the ship builders and ship owners object, maintaining that since their ships are excluded from the American domestic trade, so American vessels should be kept out of a purely Canadian trade. And they doubt the power to suspend a law.

All other conditions are in favor of the development of a very flourishing ship building industry and merchant marine. In the northwest settlement is becoming denser, farming is becoming more scientific, diversified and productive, and every year a greater outpouring of freight comes from there. The railway system of Manitoba and the territories was far from equal to the handling of the crop before the close of navigation. A new outlet paralleling the Canadian railroad, namely, the Canadian Northern, will make Port Arthur a busy grain shipping point next year. The merchant marine will need to grow fast in order to catch up and keep up with the tonnage that is to be handled.

Canada's iron and steel industries have advanced to a point at which they may be expected to develop great ship building works. Already the

Dominion Iron & Steel Co. has decided to branch out into the making of steel ship plates and steel rails, and works for this purpose are expected to be in operation by the close of the present year. The Nova Scotia government offers a subsidy of \$200,000 to induce a great ship building plant to come into existence. Two or three Nova Scotia towns offer large bonuses. Representatives of British ship building firms have visited Canada within the last few months to examine into the prospects for establishing new works. Great ship building developments will be the next notable outcome of the rapidly moving times in Canada. There is reason to believe it will be assisted by the Dominion government. Mr. Tarte, the minister of public works, has repeatedly expressed himself in favor of liberally aiding private enterprise along this line.

SUMMARY OF NAVAL CONSTRUCTION.

With the exception of the Virginia, Nebraska and Milwaukee, all the warships for which contracts were let during the past year have been laid down. Excellent progress is being made in all the ship yards, as the following summary shows:

Following summary shows.		Degree of completion, Per cent.	
		Feb. 1.	March 1.
BATTLESHIPS.			
Name.	Building at		
Maine	Wm. Cramp & Sons.....	82	84
Missouri	Newport News Co.....	56	58
Ohio	Union Iron Works.....	43	55
Virginia	Newport News Co.....	0	0
Nebraska	Moran Bros. Co.....	0	0
Georgia	Bath Iron Works.....	7	7
New Jersey	Fore River S. & E. Co.....	7	7
Rhode Island	Fore River S. & E. Co.....	7	7
ARMORED CRUISERS.			
Pennsylvania	Wm. Cramp & Sons.....	15	17
West Virginia	Newport News Co.....	8	10
California	Union Iron Works.....	0	1
Colorado	Wm. Cramp & Sons.....	18	20
Maryland	Newport News Co.....	7	9
South Dakota	Union Iron Works.....	1	1
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy.....	69	74
Des Moines	Fore River S. & E. Co.....	63	65
Chattanooga	Lewis Nixon	53	56
Galveston	Wm. R. Trigg Co.....	51	53
Tacoma	Union Iron Works.....	20	40
Cleveland	Bath Iron Works.....	74	76
St. Louis	Neafie & Levy.....	2	3
Milwaukee	Union Iron Works.....	0	0
Charleston	Newport News Co.....	0	1
MONITORS.			
Arkansas	Newport News Co.....	89	92
Nevada	Bath Iron Works.....	92	92
Florida	Lewis Nixon	86	88
Wyoming	Union Iron Works.....	75	80
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy.....	99	99
Barry	Neafie & Levy.....	97	97
Chauncey	Neafie & Levy.....	98	98
Dale	Wm. R. Trigg Co.....	98	98
Decatur	Wm. R. Trigg Co.....	98	99
Hopkins	Harlan & Hollingsworth.....	80	82
Hull	Harlan & Hollingsworth.....	78	81
Lawrence	Fore River S. & E. Co.....	99	99
MacDonough	Fore River S. & E. Co.....	98	98
Paul Jones	Union Iron Works.....	85	85
Perry	Union Iron Works.....	89	89
Preble	Union Iron Works.....	87	87
Stewart	Gas Engine & Power Co.....	64	65
Truxton	Maryland Steel Co.....	83	86
Whipple	Maryland Steel Co.....	80	83
Worden	Maryland Steel Co.....	80	83
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth.....	98	98
Goldsborough	Wolf & Zwicker.....	93	93
Blakely	Geo. Lawley & Son.....	98	98
DeLong	Geo. Lawley & Son.....	98	98
Nicholson	Lewis Nixon	97	97
O'Brien	Lewis Nixon	98	98
Thornton	Wm. R. Trigg Co.....	97	98
Tingey	Columbian Iron Works.....	74	74
Wilkes	Gas Engine & Power Co.....	94	94
SUBMARINE TORPEDO BOATS.			
Plunger	Lewis Nixon	75	80
Adder	Lewis Nixon	97	98
Grampus	Union Iron Works.....	60	62
Moccasin	Lewis Nixon	94	96
Pike	Union Iron Works.....	55	57
Porpoise	Lewis Nixon	89	92
Shark	Lewis Nixon	86	88

The Red Star line steamer Woesland and the British steamer Harmonides met in collision last week off Holyhead on the coast of Wales. The Woesland sank shortly thereafter, but the Harmonides succeeded in rescuing the passengers and crew. There were thirty-two cabin and eighty-two steerage passengers. The Woesland was owned by the International Navigation Co., but flew the Belgian flag. She was formerly the Cunarder Russia. She was a four-masted, bark-rigged, iron vessel of 3,676 tons net. Messrs. J. & G. Thompson built her in Glasgow in 1867. Her dimensions were 436.1 ft. long, 41.9 ft. beam and 29.9 ft. depth. She ran in the Liverpool-Philadelphia service.

The Tacoma Ship Building Co. and the Marine Machine & Engine Works have been consolidated and incorporated as the Hardy Ship Building Co., Tacoma, Wash. The capital stock is \$200,000, of which \$95,000 is treasury stock. A prospectus regarding the new organization says that the ship building industry on Puget sound is very active, but that the company has to decline lots of work owing to lack of working capital. It therefore offers 5,000 shares of its stock at 80 cents on the dollar to provide working capital. The present stockholders are: W. C. Wheeler, Charles B. Hurley, Henry Longstreth, John B. Hardy and F. S. Blattner.

The Chilean government has ordered the construction in England of two battleships of 12,000 tons each. One is to be built by the Armstrongs and the other by Vicker's Sons & Maxim. The vessels are to cost about \$5,000,000 each.

ADMIRAL MELVILLE'S PAPER DISCUSSED IN ENGLAND.

Whenever Rear Admiral Melville, chief of the bureau of steam engineering of the navy department, breaks into print he is sure of a respectful audience throughout Great Britain. Lately he contributed to the Philadelphia Record an article upon "Naval Development during the Next Decade," which was reprinted in our impression of Feb. 27. The Engineer of London, in discussing the paper, says:

"Admiral Melville's position is akin to that worthily held by Sir John Durston in this country; but he has a much freer hand. His position is more influential because there is nothing quite like our own board of admiralty at Washington. What Admiral Melville has to say is, at this juncture, when our navy estimates are being discussed, of supreme importance. He anticipates; he suggests; he prophesies. But his anticipations may be regarded as certainties; his suggestions are the embodiment of accepted intentions; his prophesies are those of one who knows. Very remarkable is the picture which he draws of the naval policy of the United States. After referring to the immense wealth of his country, which has forced the United States into the position of a world power, he goes on to explain that it is not only the right of the United States to extend its trade but its duty to prevent foreign markets from being unjustly taken away. The following passage is so admirable that we reproduce it with pleasure. It defines to perfection the part which great nations like this and the United States should play: 'It should ever be kept in mind that those countries which are rich in natural resources, but wherein there is no martial spirit, are always the objects of attack and conquest. It is as essential to be in readiness to restrain by military and naval forces the foes that are beyond the boundaries of a country as it is to effectively control, by a local police, the turbulent within a community. In this age of strenuous life and action war can only be averted by those nations which are in condition to resist aggression. The best guarantee for peace is military strength and preparedness. Our environments are such that no nation would dare to attack us, except from the sea, and therefore the navy must constitute the first line of defence from a foe. We don't require a navy great enough to attack the coast of any continental power, but we do require a fleet of battleships that could quickly prevent an enemy reaching our shores. Since the navy should be too large rather than too small, it should be regarded as a weapon rather than a shield; for the exigency might arise when it would be necessary to seek the enemy's shores. If maintained to a strength sufficient to be used only as a shield, it would not be long before the navy might be compelled to retreat from its position off shore, and seek the shelter of the harbor batteries.'

"The martial spirit of the people of the United States is manifesting itself vigorously. Admiral Melville directs attention in stirring phrases to the interest taken by the community in naval matters. The strongest force arrayed in favor of naval development is the press. The fact that all political parties worth the name at the other side of the Atlantic think as one man on this point is one which we in this country will do well to take to heart. Few people in Great Britain have realized the depth of American national feeling, or the magnitude of the patriotic desire to possess a powerful navy. Admiral Melville obviously would moderate these desires; but we can easily imagine that circumstances may be too strong for him. If the people of the United States are continuously determined—and at this moment they are determined—that they will have fleets which shall be able to cope with the mightiest naval powers of the old world, not singly, but in groups the results of alliances, they will provide those fleets. In the near future Europe will have to recognize the intrusion of an enormous naval power. It is impossible that what Admiral Melville describes as going on can go on with any other result. 'The several thousand daily papers and the hundreds of magazines and periodicals are almost a unit in urging the congress to give more men and more ships to the service.' He goes on to point out that the whole labor party is at one on the subject, and as a result the congress of the United States receives, we are told, hundreds of earnest and powerful petitions urging the construction of warships at the navy yards. At least ten ship building firms in the United States can build battleships and armored cruisers, and so energetic are certain of these firms that they have a literary bureau for creating public interest in warship construction. Over fifty firms can build gunboats, and hundreds can manufacture naval stores and supplies. All these firms have a selfish, if not a patriotic interest in the enlargement of the fleet; and in the past these forces have been quite powerful factors in helping to secure more war vessels.

"Turning now from the consideration of the naval aspirations of the United States, let us see what Admiral Melville has to say as to the best way in which these aspirations can best be realized. He tells us that progressive development will not only be made in building more ships, but in making each ship more formidable. Perhaps the most interesting statement which he makes in this connection is that ships will, in the future, be built much more quickly than they have been built in the past. Up to the present five years have been required to complete a warship in America. That time must be shortened; and he tells the world very plainly that if private ship yards cannot do this, it may very well be that government ship yards will be established. As to armament, he holds that the 12-in. gun must go. Nothing was effected by it at the battle of Santiago. All that the 12-in. gun can do can be done as well with the much handier, lighter, and cheaper 10-in. gun. Admiral Melville has something very important to say concerning the effect of the impact of projectiles on armored ships. He holds that this will be very serious. To penetration he attaches little importance. The impact of several good-sized shell upon the armor protecting the machinery compartments will he tells us, undoubtedly put out of use some important auxiliaries. It will not be necessary for the shell to explode within the vessel to put the warship out of action, for the shock transmitted by the projectile striking the armor will cause some machine of importance to the fighting efficiency of the vessel to be seriously impaired. Similar opinions are held in this country, but they are not so openly expressed. But this is not all. It is extremely probable that the hull will suffer great structural damage from shock. Rivets will be sheared, angles broken. Indeed he does not hesitate to say that a ship may be sunk although not one projectile has penetrated. 'The naval engineer of the present day will find his chief concern in the indirect rather than the direct damage inflicted by modern ordnance pounding the armor of a battleship.' It will be well, we think, that the people of this country shall take due cognizance of the facts set forth by

Admiral Melville. It is impossible for this nation to regard without some sense of a possible risk to be incurred in the future the advent of another great naval power. We have for our consideration not the interested advocacy of the party politician, the ship builder, the armor plate maker or the engineer, but the throbbing, earnest desire of a great nation to possess a fleet which will render its influence powerful in deliberations with its peers. We, on our part, must take the lesson to heart. This is not the time to hold our hands. We may well tolerate another naval power equal to our own, an English-speaking people, one with us in blood. But no kinship, no friendship must be suffered to bind us to the ever present, ever cogent truth that Great Britain can never under any circumstances permit any other nation to excel her in that sea power on which she depends for her existence."

COMMERCIAL RELATIONS WITH SPAIN.

Commercial relations between the United States and Spain have been resumed with apparently greater cordiality and certainly with greater activity than ever before. The figures of the treasury bureau of statistics show that both the imports into the United States from Spain and exports from the United States to Spain were, with a single exception, greater in the calendar year 1901 than in any preceding year. Our imports from Spain during the year ending with December, 1901, amounted to \$7,040,758, and our exports to Spain were \$16,785,711. Comparing 1901 with 1891, it is shown that our imports from Spain have grown from \$4,906,475 to \$7,040,758, and that exports to Spain from the United States have increased from \$12,887,477 to \$16,785,711. Comparing present conditions with those of 1898, it appears that our imports from Spain have increased from \$3,606,308 in 1898 to the above mentioned figure, \$7,040,758; and our exports to Spain from \$8,050,475 in 1898 to \$16,785,711, as already stated. This growth in the commerce with Spain is especially interesting at the present moment in view of the fact that our exports to many of the other European countries show a decline. In the calendar year 1901 our exports to Austria-Hungary, France, Germany, Greece, Italy, Portugal, Prussia, Sweden and Norway, Switzerland and the United Kingdom show a decrease as compared with 1900; while to Spain they show an increase from \$15,200,917 to \$16,785,711. On the import side, our imports from Austria-Hungary, Germany, Russia, Sweden and Norway and Switzerland show a decrease, while those from Spain have increased from \$5,382,662 in 1900 to \$7,040,758 in 1901.

The following table shows the commerce between the United States and Spain in each calendar year from 1891 to 1901:

Calendar year.	Imports into the United States from Spain.	Exports from the United States to Spain.
1891	\$4,906,475	\$12,887,477
1892	5,258,934	11,911,644
1893	4,983,710	12,884,785
1894	3,675,569	13,478,230
1895	3,825,980	10,594,474
1896	3,736,411	10,869,180
1897	3,596,184	11,304,080
1898	3,606,308	8,050,475
1899	5,341,636	11,528,777
1900	5,538,662	15,200,917
1901	7,040,758	16,785,711

The exports from the United States to Spain are chiefly articles for use in manufacturing, cotton, lumber, crude mineral oil and tobacco being the principal articles in the list, by far the largest in the list being cotton. Our imports from Spain are chiefly fruits and nuts, wines, chemicals, corks and cork bark, and iron ore of a special grade not readily produced in the United States. Lemons and oranges form a much smaller proportion of the imports now than a few years ago, due to the fact that citrus fruits are now largely produced in the United States. The importation of raisins has also greatly reduced in value, by reason of the increased production of raisins in the United States. Imports of preserved and other fruits from Spain have, on the other hand, increased, as have also those of almonds and other nuts.

The following are the principal articles imported into the United States from, and exported from the United States to Spain during the fiscal year 1901, the detailed figures for the calendar year not being at present available: Imported from Spain—Fruits and nuts, \$1,661,866; wines, \$580,492; cork manufactures, \$446,047; corkwood and bark, \$256,474; iron ore, \$351,740. Exported to Spain—Cotton, \$11,204,979; leaf tobacco, \$946,167; staves, \$674,214; crude mineral oil, \$489,961; boards, \$290,606; wheat, \$274,928; locomotive engines, \$216,228; cars, \$227,960; corn, \$105,687.

JEFFERSON FAVORED A SUBSIDY.

If particular nations grasp at undue shares of our commerce, and more especially if they seize on the means of the United States to convert them into aliment for their own strength and withdraw them entirely from the support of those to whom they belong, defensive and protective measures become necessary on the part of the nation whose marine resources are thus invaded; or it will be disarmed of its defense, its productions will be at the mercy of the nation which has possessed itself exclusively of the means of carrying them and its politics may be influenced by those who command its commerce.—Thomas Jefferson.

New colored charts of Manitou passage, Lake Michigan, and of Lake St. Clair, taking in connecting channels from Windmill point up to Algonac, have recently been issued from the lake survey office at Detroit. New charts of various parts of the lakes are printed almost every week of late, and all of them show great improvement over the old charts. They are very low in cost. The Marine Review has a full stock on hand at all times.

The Ballard Dry Dock & Ship Building Co., Ballard, Wash., has been organized and will at once erect a plant for the building of vessels, as well as a marine railway capable of hauling out a 2,000-ton vessel. The chief owners of the enterprise are Messrs. Walter C. Bryant, Capt. Richard Chilcott, Albert H. Bryant, Herman Sanderson and W. H. Lake.

ROPE.

BY MR. J. W. WALTON.

Instead of issuing its usual calendar this year the Upson-Walton Co. of Cleveland has published a little book upon the subject of "Rope," which is so large a part of its business. The book is very instructive and is splendidly illustrated and printed throughout. The marginal notes are in red. It bears a special interest because the book is the work of Mr. J. W. Walton, a member of the firm, who has spent a great deal of time upon it. Certainly he has pursued the subject of rope until it is lost in the twilight of antiquity. Mr. Walton surmises that maybe the apes, some species of which swing from tree to tree by means of vines and supple branches, or make living cables by climbing over each other's bodies, were the first rope makers. It is clear that the primitive races, however savage, must have felt the necessity of cordage. For the purpose of crossing streams the ancient Peruvians used to twist together the strong fibers of the maguey, forming ropes sometimes as large as a man's body.

Mr. Walton briefly traces the history of rope from the Egyptian period down to the present time, enriching the narrative throughout with quotations from the literature of the world. But rope, though of an antiquity reaching almost, if not quite, to the earliest ages of man, has until within a century and a half escaped the attention of mechanical inventors. The primitive wheel, the workman, with a bundle of hemp strung around his waist, and the slow, laborious and imperfect operation laying and twisting the strands by manual labor have been seen in Cleveland by Mr. Walton and may still be noted in remote places. The yarns supported at intervals upon "stake-heads" are stretched the full length of the rope-walk, then divided into the number required, afterwards slowly twisted together into strands and these into ropes. When cables were required our forefathers used to twist ropes together until the desired size was attained. Of course the result was a rope of strands unevenly formed and thus of unequal strength. The ideal rope of any given material is one in which every fiber sustains its proportionate strain and in which the tension is so perfect that if the rope were suspended its full length, with a heavy weight attached to the bottom, the right-handed twist of the strands would exactly counterbalance the left-handed twist in the individual yarns or wires and the weight would not turn. This perfect rope is yet to be made but such is the progress of modern methods that very close results have been attained. The late war with Spain, which has brought into our lap the sole source of supply of Manila hemp, has caused great interest in the subject of rope making.

Foremost among the rope fibers must be placed the *Musa textilis*, known to the Filipinos as Abaca and to the world at large as Manila hemp. It is really a species of plantain of which the species best known in the United States is the banana, which it very closely resembles. Although there is great similarity between the products of Cuba and of the Philippines, where sugar and tobacco are the staples, it is a singular fact that all attempts to cultivate Manila hemp in the West Indies have signally failed. The fiber is white, lustrous, easily separated, stiff and very tenacious. It is also very light; indeed no other fiber ever discovered is so well adapted to the various uses to which Manila rope is put, especially for the running ropes of vessels. The cultivation of the plant is simple. On exposed level lands the plants do not thrive very well and in marshy ground not at all. The necessary conditions seem to be shade, abundant moisture and good drainage. It requires the product of five or six acres to produce a ton of fiber at a cutting. Plantations are estimated to yield, under good management, as high as 30 per cent. on their investment. No other vegetable fiber is so tenacious as Manila hemp. No machine has yet been invented for extracting the fiber from the plant.

"Many attempts have been made," said Mr. Walton, "to do this by improved machinery, but thus far they have been unsuccessful. If the entire length of fiber in a strip of bast could bear the strain of full tension, instead of its having to be wound around a cylinder, or the operator's arm, then a machine could be contrived to do the work. In making telescopic lenses, in cleaning Manila hemp and in the work of charity the human touch seems to be essential."

After the native workman has marketed his hemp it is put into bales of about 270 lbs. each, so that it can reach the ship. This is done by means of bullock teams, and especially by crude native boats, called *cascoes*. This method of lighterage is so antiquated and cumbersome that a company has recently been formed, called the Philippine Transportation & Construction Co., of which Mr. Henry F. Lyman, secretary of the Upson-Walton Co. is president, for the betterment of those intolerable conditions. A fleet of nineteen steel boats, formerly running from Cleveland to New York through the Erie canal, are now on their way to the Philippines.

Manila hemp constitutes more than one-third of the export trade of the Philippine islands. During the past five years more than one-half of the total product has come to this country, about four-tenths have gone to Great Britain and the continent. The normal supply is about 850,000 bales, or 230,000,000 lbs.

Second in importance among the great vegetable fibers of the world is that commonly known as sisal. A native of Mexico, it was named for a seaport in northern Yucatan. From 1,000 to 1,500 lbs. per acre is a common annual yield, the number of plants being about 650, averaging thirty-three leaves to the plant. Growers expect to clean from 50 to 70 lbs. of fiber from every 1,000 leaves. The crop may be relied upon with almost complete certainty. The principal port of shipment from Mexico for sisal fiber is Progreso on the north coast of Yucatan. The city owes its present superiority almost entirely to the above trade. During the year 1901, 515,358 bales of the value of \$13,500,000 were exported, principally to New York.

Jute is essentially a product of India. It is planted annually in as wet a soil as can be used. A large quantity is being consumed of late in India for the manufacture of burlap. The jute industry is constantly growing.

PROCESSES OF MANUFACTURING ROPE.

In what follows the description of the process of manufacture of rope applies almost exactly to either manila or sisal, as the process of manufacturing the rope is almost identical. The machinery used in the manufacture of rope is divided, according to the operations to be per-

formed, into four general classes, namely, preparation, spinning, forming and laying. The preparation machinery may be divided into two classes—the drawing machines, single chains, and the heckling machines, or breakers, which are double-chain machines. The hemp is received in tightly compressed bales, which are taken to the opening room where the lashings are cut from the bales, and the hemp, which is packed in heads or hands, is taken out and each bunch untied and shaken out thoroughly. It is then passed through a softening machine, consisting of from six to ten bars of heavy fluted iron rollers. An oil sprinkler at the head of this machine enables the operator to distribute over the hemp a quantity of oil, varying according to the amount of hemp, as well as to the uses to which the yarns or rope are to be put. The hemp is softened and the fiber separated, and is now ready for the heckling or combing process.

In the case of manila, owing to the fineness or softness of the hemp at the top, the fibers are not separated, but are bunched together into a tow mass. In order to separate the fiber and remove the tow, an operation termed "scutching" is introduced. A bundle of hemp is seized at the middle of its length, and the top end thrown against the swift revolving cylinder. This rim is thickly studded with steel pins or blades about 4 in. long, being held so that the seed end comes in contact with the rapidly moving pins, the hemp is teased out, the fibers are straightened, and the tow removed from the hemp and thrown from the cylinders by centrifugal force. The hemp is fed to a breaker, or a double-chain machine, one chain traveling very much faster than the other, the relative speeds of the two chains being about ten to one.

A chain is an endless combination of bars linked together, the distance between each two bars being equal. The bars are of round iron, varying in diameter from $\frac{1}{2}$ to $1\frac{1}{2}$ in., and are studded with pins, which vary in length, thickness and distance in about the same proportion as the bars. The heavier the bar, the coarser the pin, and vice versa, being largest at the beginning of the preparation, and decreasing in size on each successive working machine. At each end of the bar is a "dog," which is moved through guide bars in such a way as to keep the pins in a vertical position. The chains are moved by means of a carrier wheel, consisting of from five to ten pinions. The carrier is connected to the motive power by gearing, thus permitting changes in the speed of the chain to be made.

The single-chain machine, or drawing frame, consists of a chain and a pair of fluted iron rollers placed close to one end of the chain. These rollers, or drawing rolls, as they are called, have a speed of four to six times that of the chain, and in consequence draw a body of hemp on the chain into a sliver four or six times the original length. The breakers are heavier and stronger than the drawing frames, and have, in addition to the chain and drawing rolls described above, a second chain, moving at from one-sixth to one-tenth of the speed of the fast chain, or the chain nearest the head. These two chains, one moving six or ten times faster than the other, heckle, or comb, out the hemp into the sliver, made up of the hemp fibers all extending in the same direction, the hemp being firmly imbedded on the slow chain and the pins of the fast chain passing through each operation as presented. The fiber is straightened out, and in each revolution of the fast chain a body of hemp is drawn into a sliver of ten times the original length. Naturally, this sliver is not even or uniform throughout its length, due in most cases to irregular feeding, and also to unequal softening of the hemp. To correct the inequalities, six or eight slivers are fed on the slow chain of the second breaker, which operation further completes the separation and straightening of the fiber, and at the same time makes the sliver more uniform throughout its length. The subsequent operations are essentially the same as described above; six, eight or ten slivers are placed behind machines consisting of a slow and fast chain. The bars in these chains are in each successive working brought closer together, and also are finer and the distance between each two made smaller in each case.

Sisal receives from five to eight and manila from four to six workings on the double-chain machines. The sliver is then considered sufficiently even, and the fiber soft and elastic. A number of such slivers are placed back of the drawing frame, or single-chain machine, to be drawn to a size which will admit of its being spun into yarns or threads of 300 to 650 ft. to the pound, and sometimes even longer.

The drawing frame is made up of a chain studded with fine pins, and in place of a fast chain is a pair of fluted iron rollers with a speed of four to five times that of the chain. The difference in speed will reduce the bulk of the slivers to one-fourth or one-fifth the original size, by drawing them to the single sliver four or five times the original length. After one or two workings on the drawing frames, the sliver is ready for the finishing machine, where the hemp is finally reduced to a condition ready for spinning. After the last operation on the finishing machines the sliver is run into cans, which are then taken into the spinning or jenny room, where it is spun or twisted into yarn of any desired size.

The jenny spins and winds the yarn on spools or bobbins, holding about 10 lbs. of yarn or threads. The bobbins are sent to the rope-walk, or rope-machine room, to be made into rope. Rope of a diameter of $\frac{3}{4}$ -in. or less is commonly made on rope machines. Rope of larger sizes used formerly always to be made on rope-walks, but now rope of any size is made on machines, and the product of the machine is equal in every respect to the product of the rope-walk rope. The size of the rope determines the number of threads necessary to make it, up to, say twenty-one thread, or $\frac{1}{2}$ -in. diameter. One-third of the number of threads are twisted into a strand where three-strand rope is wanted, and one-quarter of the number when a four-strand rope is required. These strands are called readies. Above, say twenty-one thread, or $\frac{1}{2}$ -in. diameter, the number of yarns in a ready depend upon the size of the yarns used to make same, and vary with different manufacturers, as some use a larger size yarn than others. The readies are made on a machine called a former, and when finished, either three or four former reels containing the readies are taken out and put into the rope-making machine, where they are laid up into either three or four-strand rope, as required.

In a rope-walk the bobbins are mounted upon a rack; the required number of threads to make a strand are passed through the same number of holes in a perforated plate to and through a trumpet-shaped tube, and fastened to a hook on the forming machine. This hook can be geared to

revolve a definite number of times per each foot of travel of the former; in this way a regular amount of turn is put into the strand. The turn varies with the size of the strand, more turn being required in the small than in the large sizes. The length of the track limits the travel of the former and also the length of the strand; six strands are generally made at one time. As many strands as are required for the rope are stretched at full length along the walk and attached at each end to hooks on the laying machine. The hooks are set revolving continuing the fore-turn placed in the strand by the former. At one of the laying machines each strand is in turn removed from its hook and laid in one of three equidistant concentric grooves of a cone-shaped block called the "top," and then fastened together on the center hook of the machine. The hooks on the two laying machines are now set revolving, the direction of the turn at one end being the opposite to that at the other end; as a consequence being fastened at one end to one hook and at the other end to three hooks; the strands turn or twist on themselves at the end where there is one hook. As the twist or turn is communicated to the strand between the single hook and the "top," the latter is pushed forward, leaving the laid rope behind it.

Great care must be exercised in guiding the block, for on its uniform motion depends the firmness of the rope, as well as the uniform character of its lay. The essential object of spinning hemp is to twist the fibers together, so that by the mutual friction among the fibers composing a thread the strength of the thread is made equal to the strain necessary to break it at its smallest section; hence the right amount of twist is a matter of considerable importance. Too much twist injures the individual fiber and causes the thread to kink and bunch, while too small an amount of turn would allow the fibers to slip and part from one another. The same reason applies to the twisting of threads together to form a strand and the strands to form a rope. The turn which forms the strand is the reverse of the turn placed in the yarn in spinning, and again, the twist which laid the rope is the opposite of the twist or turn in the strand, and hence similar to that of the yarn.

These operations may appear at first sight strange and contradictory as well as unnecessary, but every effect must have a cause. Were the strand to have the same twist as the thread which is spun with its full share, more twist would be added to the thread, causing it at the first opportunity to kink, and by destroying the parallelism of the fibers, weaken the thread. The strand and thread, both having the same turn, each would assist the other to unravel, while with opposite turn each assists the other in preserving the unity and uniformity of the strand. Some of the turn in the thread is taken out by the formation of the strand; to compensate for the loss of turn in the strand when laying the rope, an excess of turn is put in the strands while they are fastened to the laying machines. The excess so put in equals the amount taken out by the laying, so that the strand made into rope possesses a normal amount of turn. The turn in the yarn and rope is generally right-handed, while that in the strand is left-handed. If the same turn were put in the strand as in the rope, the rope while under tension would preserve its uniformity and appear well laid, but immediately upon the release of the tension each strand would unwind and separate and the rope would part. If the strands are tied together at the ends they would close up, shortening the rope. If while in this condition the ropes were again subjected to tension, the strands would stretch, but the lay would not be uniform. The independent stretch of each strand as well as its unequal lay would cause each strand, in assuming its share of the load, to slide and saw upon its neighbors, injuring the fibers and eventually cutting the rope.

The fibers of the prepared manila are composed of elongated cells, roughly resembling a bundle of pipes. They are extremely tenacious longitudinally, but considerably less so transversely, not being very strongly cemented together. Bearing these facts in mind, it will be seen that a loosely twisted, or "long-laid" rope affords a greater resistance, inasmuch as the fibers are in the line of their greatest strength. Yet inasmuch as the friction between the fibers is an essential factor in the perfect rope, it is clear that this friction is greater, the harder the rope is twisted. These two elements, working against each other, require for their adjustment the nicest judgment, coupled with experience. To invest in a quality of rope made hap-hazard, or by guess-work, is short-sighted policy.

The quality of the oil necessarily used in laying up the rope is another element which enters into the cost. Some "cheap" rope is so heavily saturated with cheap grease as to be absolutely offensive. Since manila rope is universally sold by weight, the temptation to "load" it is great. On the other hand it is more readily detected than the adulteration with red hemp and sisal.

In estimating the difference in value between first and second-class rope, it must always be borne in mind that this difference increases with time of service. Thus a new second-class rope may withstand a breaking strain very nearly equal to that of a new first-class rope, yet after a few months' wear the difference will be vastly greater. This is peculiarly true of sisal rope, where a difference of more than 50 per cent. has been noted. Durability, as well as tensile strength, is thus seen to be an important factor in buying rope.

Almost the entire product of a rope mill is shipped out in coils, although smaller size ropes are put up in either coils or reels. Some of the product, however, of a rope mill is shipped in balls, and especially is this the case with binder twine. When yarn is spun for this purpose the bobbins are taken direct from the jenny room, where the yarn is spun, to the balling room. The bobbins are here placed on the balling machine, where they are made up into balls of four pounds each, and packed into specially made bags, weighing when completed and ready for shipment, 50 lbs. gross.

In buying rope, the custom in Great Britain, and formerly in this country, was to designate the sizes by the circumference. Thus, a line 1 in. in diameter, was formerly, and by sailors still is, denominated "3 in." or "3 1/4 in." according to the desire of the skipper. Since no one has succeeded in squaring the circle, any more than in discovering perpetual motion, it is obvious that some confusion was likely to ensue, particularly in the case of such sizes as "2 in." which might be either 2 in. diameter, or 5/8 in. diameter. Our advice to our customers is to order by diameter solely, thus avoiding all uncertainty.

Manufacturers vary somewhat as to the sizes of their ropes. A hard twisted line may have the same amount and weight of fiber in it as a more

loosely twisted one, and yet not measure quite as much in diameter. A tightly twisted rope is apt to "kink" as it comes out of the coil. This may be counteracted by coiling it one or more times through itself. Most of our lines are laid up in coils of 1,200 ft., or half coils of 600 ft. But rope of 3/8 in. diameter and less is kept only in full coils.

Following is a table of weights and strength of manila rope based on our experience of upwards of thirty years. It may be regarded as substantially correct, though there is sure to be some variation, even in ropes made at the same time at the same factory:

WEIGHT AND STRENGTH OF MANILA ROPE.

Diameter in inches.	Number feet in one pound.	Weight of full coil of 120 ft. pounds.	Strength of a new rope, pounds.	Diameter in inches.	Number feet in one pound.	Weight of full coil of 120 ft. pounds.	Strength of a new rope, pounds.
1/4	43	25	450	1 3/8	1—7	720	13,450
5/16	33	37	750	1 1/2	1—5	800	15,150
3/8	21	50	900	1 9/16	1—4	900	16,700
7/16	17	75	1,250	1 5/8	1—2	1,000	18,700
1/2	13	100	1,700	1 3/4	1—0	1,200	22,600
9/16	10	130	2,250	2	—10in.	1,440	26,900
5/8	7—6in.	160	3,000	2 1/8	—8 1/2	1,680	31,500
3/4	6	200	3,900	2 1/4	—7 1/2	1,960	36,600
13/16	5	250	4,700	2 1/2	—6 3/4	2,240	42,000
7/8	4	300	5,600	2 5/8	—5 1/2	2,560	47,800
1	3—3	360	6,750	2 7/8	—5	2,880	54,000
1 1/16	2—9	420	7,850	3	—4 1/2	3,240	60,500
1 1/8	2—4	480	9,150	3 1/2	—3 3/4	4,400	82,500
1 1/4	2—1	560	10,600	4	—2 2/3	5,380	108,000
1 5/16	1—10	640	11,950				

The above weights are approximate only and apply to sisal as well as to manila rope.

THE ORIGIN OF WIRE ROPE.

Like many other useful inventions, the origin of wire rope is in dispute. Some authorities claim that this apparently intractable material was first made into rope among the Hartz mountains, about the year 1832. It is more certain that in the year 1835, a London engineer named Andrew Smith patented a machine for its manufacture in England. There is a tradition that this vast industry owes its origin to the persistency of a humble rodent. The aforesaid Smith, so the story goes, was making some sort of Venetian blind that was to be moved by a cat-gut cord. Whether through a desire to even up matters with their ancient enemy or otherwise, the cord was eaten by rats as fast as Mr. Andrew Smith could replace it. Something more had to be done. The Smith family reputation for success was at stake. So Andrew bethought himself and began to twist a small cord of fine wires, which, if they tried to gnaw it, must have worn out the incisors of the Muridae. The first introduction of wire rope into this country is in dispute between the Morris and Essex canal and the Allegheny Portage railroad. The number of applications in this country at present is enormous. It is difficult to conceive by what means the elevator service of our modern high buildings could be operated without use of this material. Thus the wire rope has played no inconsiderable part in the growth and development of our great cities.

The materials used in making wire rope vary from a cheap grade of iron to the finest steel. Experience has demonstrated that a soft grade of wire is the most durable when constantly bending over a small sheave or drum, but a stiff rope, such as is in demand for rigging or bridge work, calls for a high breaking strain. To get this high tensile strength something of pliability must be sacrificed. Crystallization takes place rapidly in a quick bending steel wire rope. Thus it will be readily seen that in ordering a wire rope it is well to mention the use to which it is to be put. The art of fitting wire rope is a special trade, requiring experience and skill. Mistakes due to inexperience are too costly to be weighed in the balance against the cost of expert service.

One of the most modern applications of wire ropes is that of galvanized steel hawsers, for towing the vessels in the service of the great lakes. After spending a large amount of money in experimentation, so as to learn the kind best adapted for use through the winding, shallow, and rocky rivers through which the lake steamers are obliged to pass with their consorts, our company has settled upon a form of construction and quality of material which we recommend with great confidence. Wire rope, in this country, is universally sold by the foot, while ropes made of vegetable fiber are invariably sold by the pound.

To describe the various processes of wire rope manufacture would be interesting, but would require space beyond the reasonable limits of the present work. Three leading types of machines are in use, the principle in each being a "sun and planet" motion. A jute or other hempen core is wrought into the interior of most metal ropes, and this serves as a cushion to equalize the tension of the various wires and strands, as well as to secure greater pliability. In the case of hawser laid, or tiller rope, this core is found in each individual strand, as well as in the center of the rope itself. The result is a rope of extreme pliability, though of modified strength.

Ropes made of fine wires, laid up nineteen to the strand, are preferred for hoisting purposes, whether made of iron or of steel. For all applications of hoisting rope, a main essential is a large bending arc, whether of drum or sheave. A short bend, and particularly a bend in different directions, rapidly destroys the life of a wire rope. Iron wire ropes are used for rapid passenger elevators, and will outwear a stronger steel rope in many places. Where wire ropes are subject to abrasion, as in mining tramway plants, they are made with only seven wires to the strand. Wherever any bright wire rope is exposed to the weather, it is important to preserve it from rust by means of a coating of some kind of lubricant, such as Dixon's wire rope grease. Wire rope should be oiled as regularly as a piece of machinery. Galvanized ropes are used for standing rigging and for guys, but not for running lines, for which they are not adapted. The ends are secured by means of eyes spliced around wrought iron thimbles. Not every old salt knows how to splice a wire rope. To do it well requires a skilled artisan with modern tools.

TONNAGE STATISTICS FOR A DECADE.

Sir John Glover recently read a paper before the Royal Statistical Society upon the subject "Tonnage Statistics of the Decade 1891-1900." The Review has already briefly referred to this paper, but is now enabled to go into it a little more thoroughly.

In the course of his paper Sir John reviewed the general characteristics of the decade, in so far as matters affecting the employment and output of shipping were concerned, and whilst discussing the legislation of the period, expressed satisfaction that although the merchant shipping acts had been consolidated there had been so little fresh legislation to regulate the business of the ship owner. Turning to the question of the volume of British trade, the author expressed his dissent from the oft-expressed opinion that the trade of Great Britain is failing. He showed that the statistics of imports and exports, and the movement of the weighty and bulky articles of commerce which chiefly affect shipping and freights, did not in any way support that view. The increased export of coal, for example, is nearly equal to the whole coal export of 1880, whilst the amount of wheat imported, though its sources of origin change, is also continually increasing. After an exhaustive tabular examination of the entrances and clearances of tonnage, Sir John summed up his remarks on this head by stating that as regards the total amount of British tonnage entered and cleared with cargoes at ports in the United Kingdom to and from foreign ports, they had risen from 8,000,000 tons in 1850 to 12,000,000 tons in 1860, 22,000,000 tons in 1870, about 36,000,000 tons in 1880, 46,000,000 tons in 1890, and over 52,000,000 tons in 1900—a sufficiently remarkable increase on the larger totals, even if the actual rate of increase might be somewhat slackening. He added that the increase in the total of foreign tonnage at British ports is even more remarkable, rising as it did from under 4,000,000 tons in 1850 to 8,745,000 tons in 1860, till in 1890 it was 16,500,000, and in 1900 it was 27,500,000 of tons. But, remarkable as this growth was, it was an increase on a small original figure, and thus, in spite of the great apparent growth of foreign tonnage trading to British ports, Great Britain has held its own in its own trade in a remarkable degree, there having been lessening proportions of foreign tonnage in every decade since 1860, save in the last, and then the proportion is but a trifle higher than it was in 1850. This, Sir John submitted, is very conclusive evidence of the strength of position and of the vitality of its trade.

The author next proceeded to examine the tonnage of vessels trading to foreign countries to and from British ports, and to dissect it according to its flag. In regard to the figures here discussed it was concluded that whatever might be the feelings politically entertained on the continent towards Great Britain it was apparent that vessels bearing foreign flags are visiting English ports in a constantly increasing degree, and that in maritime transactions, at any rate, England enjoys the full confidence of the leading European states.

A very interesting table dealt with the number of vessels registered as belonging to the United Kingdom, with their average size, and this showed how, whilst steamers are constantly increasing in numbers and in average size, there is not much change in the mean size of sailing vessels, whilst their numbers since the year 1880 have shown a steady and decided shrinkage.

After a discussion of the extent to which modern shipping has increased in actual efficiency as a cargo-moving machine over that of an earlier period, the author turned to the examination of the amount of work done by British tonnage in the carrying trade of foreign nations. The proportion of entries and clearances under the British flag, and under the national flag in the countries stated, was as follows:

	Under the British flag. Per cent.	Under the National flag. Per cent.
Portugal	57.3	7.3
United States	52.8	16.9
Russia	44.7	10.3
Holland	44.6	25.0
Belgium	44.6	16.3
France	43.0	28.4
Germany	29.9	47.5
Italy	23.8	48.8
Norway	12.0	66.1
Sweden	12.0	38.3

From the figures he deduced it appears that whilst in his last review the proportion of their own trade done by Russian ships was but 7.3 per cent., that figure had for 1898 risen to 10.3 per cent. But the causes of this increase seem entirely special, and are due to the state aid given by the government to the swift vessels of the volunteer fleet. If they and their work were excluded the increase, if any, would not be considerable. In Norwegian and Swedish trade again there is a decrease in the proportion done under the British flag, the Scandinavian nations having been the chief buyers of the smaller and older class of British ships, which they have worked themselves in their own trades instead of, as formerly, having this duty performed by British ships. Germany, in consequence of the great efforts she is making to strengthen her maritime position, is doing more and more of her own trade, the proportion done by foreign bottoms falling from 62.4 per cent. in 1880 to 57.6 per cent. ten years later, and to 52½ per cent. in the period now under review. Holland and Belgium, on the other hand, are declining in their maritime position, and in both countries there is more tonnage employed under the British flag than under all other foreign flags together.

The figures in regard to France, as given by the author, are very interesting. The total entries and clearances in 1899 were 35,692,812 tons, a fair increase during the decade from 28,967,848 tons in 1890. The French proportion of this tonnage was 31.9 per cent. for 1890 and 28.4 per cent. for 1899. It varied very little throughout the decade, but generally downwards. The British proportion of entries and clearances in 1889 was represented by 40.6 per cent.; in the larger trade of 1899 it was 43 per cent.

"In my paper for 1880," said Sir John, "the percentage of all foreign flags in the French trade was 72 per cent.; in the next decade, perhaps helped by bounties, it fell to 63.9 per cent., but by 1899 the proportion of foreign had again grown to 71.6 per cent. Throughout the last decade a large number of sailing vessels appear to have been built in France, including some large vessels; but the average size is so small that the

bulk must have been for petit cabotage, from which, as well as from the Algerian coast, foreign ships are excluded. The average size of the sailing ships built in 1900 appears to be only 70 tons, and the effect on the proportion of French tonnage in the French entries and clearances being what I have stated, viz., only 28.4 per cent. in 1899, against 31.9 per cent. in 1890, it is difficult to see what benefit the French government and people have derived from the large sums paid in postal subsidies, and in bounties for construction and navigation. It would appear that the British tonnage in French ports exceeds by one-half all other foreign tonnage put together, and by about the same proportion does it exceed the tonnage under the national flag. If one could be assured that this would necessarily and always be the result of bounties it would of course suit us that they should be extended in other states. As affecting France, for whose supposed interest they are given, they are certainly remarkable."

When examining the figures for the United States the author remarked that, notwithstanding the large increase in the total tonnage entered and cleared in American ports since 1860, the proportion of entrances and clearances under the American flag remain practically the same now as forty years ago.

Finally, the author made some observations which are certainly worthy of earnest attention, as to the position in which Great Britain now finds itself in regard to the supplies of food for its crowded population, and showed the risks to which it is now exposed from shortness of food supply under stress of international complications.

Its present position, he said, is the direct result of laws wisely enacted in totally different circumstances—laws, moreover, which answered the nation's purpose at the time, though they failed to accomplish the glowing pictures of prosperity to its own agriculture with which they were heralded. Its wheat production has declined one-half since those laws were enacted, while the consumption had doubled. These circumstances might indicate that the time had come for their reconsideration. The proportion of wheat sent to Great Britain from British territory was declining in the present decade. He expressed the hope that parliament might take measures to make the old country and her dependencies more useful to each other in this matter. They had the ships to carry the wheat and the navy to protect its transit—and he submitted it ought to be a prime object of English policy to lessen its dependence for daily bread on those who either might properly want the corn themselves, or be reluctant sellers to it in case of war.

It is now announced from the Sault that the large power canal which the Clergue interests are building on the American side will certainly be completed during the coming summer. Plans for another large power canal to parallel the one already in operation on the Canadian side have been in preparation for some time and soundings are now being made. It is said that bids for the construction of this third canal will be opened shortly. It is to develop 50,000 H.P.

A new chart of the Straits of Mackinac, in colors, has just been issued by the United States lake survey office, and can be secured through the Marine Review Pub. Co., Cleveland, Ohio.

Cabins and ..Staterooms

of modern vessels especially those in the passenger service should demonstrate the supreme possibilities of the wood finisher's art.

This demands a special varnish however, as atmospheric conditions are more destructive to varnish afloat than ashore and the ordinary article is of but little use.

The varnish best adapted to withstand the deleterious influences of wind, wave and weather is "BERRY BROTHERS' SPAR VARNISH."

Further particulars and a unique marine puzzle sent free for the asking. Write us.

Berry Brothers, Limited

Varnish Manufacturers

NEW YORK BOSTON PHILADELPHIA
BALTIMORE CHICAGO
CINCINNATI ST. LOUIS SAN FRANCISCO

Factory and Main Office, DETROIT

SHIP BUILDING IN JAPAN.

The French minister to Japan, M. Duball, has reported to the government that the merchant vessels of Japan, both steam and sail, are increasing with remarkable rapidity. In the past four years 300 steamers of 100,000 tons burden and 3,000 sailing vessels of 250,000 tons have been added to the fleet. Many of these vessels are small and many are purchased from foreign countries, but M. Duball says such rapid progress in shipping facilities has rarely been made in any country, and the increase in the number of large vessels is quite remarkable. In 1896 Japan had only one merchant steamer of over 5,000 tons, while today she has over twenty-one steamers of over that capacity. It remains to be seen how far this great addition to the commercial fleet represents actual growth in Japan's business interests. In the past few years Japan has appropriated large sums to be given as bounties to encourage ship building and also the purchase of vessels from foreign countries that have not been built more than five years. In addition to this encouragement of ship building, large annual subsidies have been paid to special lines plying from Japan to Europe, Australia, Seattle and San Francisco. It is said, however, that many of the vessels built in Japan are not eligible for a share of the bounties because they have not satisfied the requirements of the building law.

It is also asserted by the British builders, who, of course, are unfriendly to Japanese ship building, that the Japanese have been tempted to build or buy vessels on the mere chance of finding a modicum of employment for them somewhere or other. The bounty paid is regulated by the tonnage of the vessel and the number of miles it runs during the year. Of course, Nagasaki, with the coal mines near it, is the great center of Japanese ship building. The waters of this most southern port of Japan have an historic interest, for it was here alone that the emperor of Japan for three centuries permitted Europeans to exchange their commodities for the products of the islands. This privilege was confined wholly to the Dutch. Now that a large number of treaty ports are open to foreign trade, the importance of Nagasaki as a commercial center has greatly declined, but the town is compensated to some extent by the large ship building interests which are centered there.

Following are estimates of the cost of improvements to be made by the United States Steel Corporation in Pittsburg, work on which has either started or will be started during the present year: Armor plate mills, \$3,000,000; Bessemer railroad, \$1,000,000; structural mills, Homestead, \$750,000; American bridge plant, new, \$1,500,000; Neville island furnace plant, \$1,500,000; other improvements, \$250,000; total, \$8,000,000.

One of the adjustable level band saw machines made by the Atlantic Works Incorporated of Philadelphia was shipped recently to the Baltimore Dry Dock Co., Baltimore, Md.

COMPAGNIE GÉNÉRALE TRANSATLANTIQUE

FRENCH LINE—UNITED STATES AND EUROPEAN MAIL ROUTE.

New York to Havre-Paris in less than one week.
Steamers sail from New York every Thursday, at 10 a. m.

Company's own vestibuled train from Havre to Paris in four hours.

FLEET 70 STEAMERS.

In New York service the following gigantic Twin Screw Steamers:

"LA LORRAINE" (new)	Twin Screw	15,000 tons	22,000 H.P.
"LA SAVOIE" (new)	"	15,000 "	22,000 "
"LA TOURAINE" (modern)	"	10,000 "	12,000 "
"L'AQUITAINE" (modern)	"	10,000 "	16,000 "

Naval officers command above steamers, insuring the same strict discipline as on a man-of-war. These ships all have double bottoms and water-tight compartments, and prescribed routes are taken to avoid fogs. The above steamers contain every modern twentieth century equipment for safety, most luxurious accommodations, and the cuisine is famous. The favorite route of the elite of both continents. For rates, plans and other particulars apply to

EUGENE DE BOCANDE, General Agent for United States and Canada, 32 Broadway, New York.

MAURICE W. KOZMINSKI, General Western Agent, 71 Dearborn St., CHICAGO, OR TO LOCAL AGENTS.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST
STOCKLESS ANCHOR.

APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON
ORDER, OR STOCK ORDERS
PROMPTLY FILLED.

A GUARANTEE OF QUALITY.


OPEN-HEARTH STEEL CASTINGS
OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO
80 000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

Seaboard Steel Casting Co.,
CHESTER, PA.

 OWNERS, Masters and Engineers of Lake Vessels may be interested in securing photographs of their ships. Possibly an owner would like a portfolio containing photos of every ship which he owns; probably masters and engineers would like a little album containing photos of the vessels in which they have sailed—in other words a photographic story of their life work.



The Marine Review is prepared to furnish single prints of vessels or portfolios of fleets. It has a pretty thorough list of active vessels, of docks, elevators, coal and ore handling machinery, etc., some the product of its own camera and others secured through established photographic agencies.




The price at which we furnish photographs is very low.



If you are interested call or write. If you call we will show you a portfolio of prints. Perhaps there might be one among them you would like.




THE MARINE REVIEW PUBLISHING CO.,
418-419 Perry-Payne Building.



"BENEDICT-NICKEL" Seamless Condenser Tubes are the only ones that resist electrolysis. Far superior to brass or copper. Our treatise on "Electrolysis of Condenser Tubes" tells why—send for it.

BENEDICT & BURNHAM MFG. CO.
Mills and Main Office, Waterbury, Conn.
New York, 253 Broadway. Boston, 172 High St.



Chemical and Physical Tests of Steel Plates made by the Tidewater Steel Co. of Chester, Pa., and used in the schooner yacht Meteor, built for the Emperor of Germany at the works of the Townsend & Downey Ship Building & Repair Co., Shooter's Island, N. Y.

Steel to meet specifications of American Bureau of Shipping; tensile strength, 58,000 to 68,000 lbs. per square inch of section; reduction of area at least 40 per cent.; elongation at least 22 per cent. in 8 in.

Number of heat.	Breadth.	Thick.	Area.	Elastic lim., per sq. in.	Tensile Strength per sq. in.	Elongation; per cent. in 8 in.	Reduction of area, per cent.	Carb.	Man.	Phos.	Sulp.
2003	1415	270	382	35,860	60000	25.	70.7	.20	.36	.029	.027
1467	1275	290	370	37,560	68100	25.	60.3	.25	.42	.016	.020
1409	1170	340	398	35,430	60530	28.75	65.1	.19	.39	.025	.028
1372	1125	350	394	37,800	60900	25.	62.2	.22	.38	.024	.023
1371	1255	270	339	37,170	65780	23.75	62.8	.23	.37	.019	.028
1045	1440	470	677	32,550	61740	28.75	61.16	.25	.42	.033	.026
1396	1255	270	339	36,250	61250	27.5	61.12	.21	.40	.029	.021
1002	1300	300	390	36,400	65400	26.25	55.1	.18	.42	.031	.023
1462	1200	340	408	35,240	61300	28.75	56.2	.19	.45	.024	.020
1004	1415	300	425	36,000	60300	28.75	65.3	.18	.41	.037	.034
1474	1210	290	351	32,120	63120	27.50	62.2	.20	.40	.025	.023

R. T. Crane, president of the Crane Co., Chicago, recently made an investigation in regard to the value of an academic education for young men who have to earn their own living and who expect to pursue a commercial life. In this connection he sent out letters of inquiry to a large number of prominent business men throughout the country, as well as college presidents and graduates, and has published the results of this investigation in pamphlet form for private distribution.

Capt. Geo. E. Dailey, who for the past six or seven years has sold groceries and meats for Miller Bros. at Toledo, will this season sell goods for Tidke Bros. at the same port.

STEEL PROPELLER WHEELS.

It is safe to say that the year 1901 will show a larger number of steel propeller wheels having been made up than the total for any two previous years, the Marine Iron Works (Station A, Chicago) alone having more than doubled any previous year's sales on these steel wheels, with three months yet to hear from. The composition being an open hearth homogeneous steel, is exceedingly tough and ductile. The sizes range from 30 in. diameter up to 5 ft. The higher first cost when compared with the cast iron wheels is very quickly earned, especially where boats are operating at times on somewhat shallow water.

8

Naphtha Launch Wanted.

Wanted—Open light-draught naphtha launch suited to about fourteen people. Canadian vessel preferred. Address Box 25, Marine Review Pub. Co., Perry-Payne building, Cleveland.

Lumber Steamer For Sale.

Capacity about 700 M ft.; also two barges, capacities, respectively, one million and 550 M ft. If interested communicate with L. S. Sullivan, Toledo, O. Apr 5.

Engine, Boilers, etc., For Sale Cheap.

Two Scotch boilers 11x12, 160 lbs. steam. Triple-expansion engine 20, 30 and 54 in. with 40 in. stroke. Shaft, wheel, anchors, chain, etc., from wrecked steamer Fedora. Thoroughly overhauled. Write for particulars. F. L. Gilbert, 301 Torrey Bldg., Duluth, Minn. March 27.

Steamer I. M. Weston For Sale.

Length, 96.5 ft.; breadth, 18 ft.; depth, 7.6 ft.; 95 tons. In first-class condition. E. J. Glackin, 363 So. Morgan street, Chicago. tf

FOR SALE.

Two First-Class Passenger Steamers.

One side-wheel steel steamer. Length, 201.4 ft.; beam, 32.5 ft.; over all, 56 ft.; depth, 9.4 ft. Hull, machinery and boiler in good condition. Has upper deck with cabin and state rooms; complete outfit and is allowed to carry 1,500 excursion passengers.

One steel propeller. Length, 155 ft.; beam, 30 ft.; depth, 9.7 ft. Hull and machinery in good condition. Has upper cabin and thirty state rooms; complete outfit. Is allowed to carry 500 excursion passengers. Speed, 15 miles per hour.

Apply to the H. W. Williams Transportation Line, South Haven, Mich. tf

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Patents 1902

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
1901.....	44,220	69,627	69,594	66,948	51,057	62,460	62,490	61,743	62,688	43,866	62,466	63,126
Total.....	801,723	783,264	714,378	664,371	438,576	418,836	355,173	271,257	234,870	172,596	148,416	115,266

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.